

DEVELOPMENT AND EVALUATION OF TEACHING DEBATE
MODEL BASED ON A DIGITAL WHITEBOARD FOR THE
BUSINESS NEGOTIATION COURSE
IN SIAM UNIVERSITY

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A thesis submitted in partial fulfillment of the requirements for Doctor
of Philosophy Program in Digital Technology Management for Education

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Thesis Title Development and Evaluation of Teaching Debate Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University

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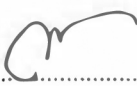
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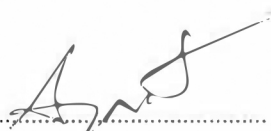
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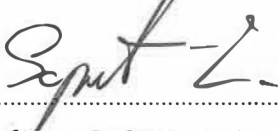
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ABSTRACT

The purposes of this research are: 1) to identify the needs and components of digital whiteboard integration in Business Negotiation teaching, 2) to develop and pilot a digital whiteboard-supported Teaching Debate Model, and 3) to evaluate the effectiveness of the model through an experimental and control group comparison. The population of this research included 320 undergraduate students across four academic years and five instructors at Siam University. The sample group was selected through stratified random sampling, with 175 students participating in the Phase 1 needs assessment, 25 students in the Phase 2 pilot study, and 100 students (50 in the experimental group and 50 in the control group) in the Phase 3 evaluation. The main research instruments include questionnaires, interview guides, observation forms, test papers, and digital whiteboard log analysis. Both quantitative and qualitative methods were employed, and statistical tools used for analysis included percentage, mean, standard deviation, t-test, factor analysis, and thematic analysis.

The results were found that: Firstly, Students and instructors reported strong needs and expectations for digital whiteboard integration, and factor analysis confirmed two main components of need, namely perceived engagement and instructional potential, and digital confidence and readiness. Secondly, The digital

whiteboard-supported Teaching Debate Model was developed based on Constructivist Learning Theory and refined through pilot testing. The finalized model included an orientation workshop, segmented whiteboard tasks, instructor moderator tools, and peer evaluation prompts, ensuring pedagogical soundness and practical feasibility. Thirdly, The evaluation in Phase 3 confirmed that the experimental group significantly outperformed the control group in post-test scores ($M = 79.84$, $SD = 6.81$ vs. $M = 71.18$, $SD = 7.65$, $p < 0.001$). Qualitative feedback further highlighted improved participation, argument structuring, and confidence in debate performance. These findings confirm that the digital whiteboard-supported Teaching Debate Model is effective, innovative, and scalable for enhancing Business Negotiation education.

Keywords: Digital whiteboard, Teaching Debate Model, Business Negotiation, Undergraduate students

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Contents

	Page
Abstract.....	i
Acknowledgement.....	iii
Contents.....	iv
List of Figures.....	vii
List of Tables.....	viii
Chapter	
1 Introduction.....	1
Rationale.....	1
Research Questions.....	2
Objectives.....	2
Research Hypothesis.....	3
Scope of the Research.....	3
Advantages.....	5
Definition of Terms.....	5
Research Framework.....	7
2 Literature Review.....	9
Constructivist Learning Theory.....	9
Digital Whiteboard Technology in Education.....	11
Debate as a Teaching Method.....	13
Integration of Technology and Debate Teaching.....	16
Business Negotiation Education.....	18
Evaluation Models in Educational Technology.....	21
Related Research.....	23
3 Research Methodology.....	33
The first phase is to answer research objective 1.....	33
The second phase is to answer research objective 2.....	42
The third phase is to answer the research objective 3.....	54

Contents (Continued)

	Page
4 Results of Analysis.....	63
Findings Related to Objective 1 – To Identify the Needs and Components of Digital Whiteboard Integration in Business Negotiation Teaching.....	66
Findings Related to Objective 2 – To Develop and Pilot a Digital Whiteboard-Supported Debate Teaching Model.....	74
Findings Related to Objective 3 – To Evaluate the Effectiveness of the Model through an Experimental and Control Group Comparison.....	84
5 Discussion Conclusion and Recommendations.....	94
Conclusion.....	94
Discussion.....	99
Recommendations.....	104
References.....	108
Appendices.....	114
A Questionnaire on the Needs for Digital Whiteboard Integration in Business Negotiation Teaching (Phase 1).....	115
B Interview Guide for Instructors (Phase 1).....	119
C Student Feedback Questionnaire (Phase 2).....	122
D Instructor Interview Guide (Phase 2).....	126
E Student Feedback Questionnaire (Phase 3).....	129
F Instructor Interview Guide (Phase 3).....	133
G Pre-Test & Post-Test Paper.....	136
H Pre-Test and Post-Test Rubric.....	140
I Appendix IOC-1 – IOC8.....	144
J Certificate of English.....	163

Contents (Continued)

	Page
K The Document for Accept Research / Full Paper.....	165
L List of Specialists and Letters of Specialists Invitation for Verification.....	167
M Official Letter.....	169
Researcher Profile.....	180

List of Figures

Figure	Page
1.1 Research Framework.....	8
4.1 Conceptual Framework of the Digital Whiteboard-Supported Teaching Debate Model.....	76
4.2 Finalized Digital Whiteboard-Supported Teaching Debate Model.....	82

List of Tables

Table	Page
3.1 Cronbach's Alpha for Questionnaire Items (n = 175).....	41
4.1 Demographic Characteristics of Participants (Phase 1, n = 175).....	67
4.2 Summary of the descriptive statistics.....	68
4.3 KMO and Bartlett's Test Results.....	69
4.4 Total Variance Explained.....	70
4.5 Rotated Component Matrix.....	71
4.6 Descriptive Statistics of Pre- and Post-Test Scores.....	78
4.7 Paired Samples t-Test Result (n = 25).....	79
4.8 Student Distribution by Academic Year (n = 100).....	85
4.9 Student Distribution by Gender (n = 100).....	85
4.10 Descriptive Statistics of Pre-Test Scores.....	87
4.11 Independent Samples t-Test for Pre-Test Scores.....	87
4.12 Descriptive Statistics of Post-Test Scores.....	88
4.13 Independent Samples t-Test for Post-Test Scores.....	89

Chapter 1

Introduction

Rationale

In the current era of rapid technological advancement, education systems are undergoing transformative changes to better meet the evolving needs of learners and educators. Digital technologies have emerged as essential tools to enhance teaching methodologies, foster engagement, and improve learning outcomes. Despite this progress, certain disciplines, such as Business Negotiation, face challenges in fully integrating these innovations into their teaching practices. Traditional lecture-based methods often fail to capture students' interest or provide the interactive and dynamic environment necessary for mastering complex concepts and practical skills. At Siam University, the Business Negotiation course exemplifies this gap, where conventional teaching strategies result in low student participation, limited critical thinking, and suboptimal comprehension of negotiation strategies.

The introduction of digital whiteboard technology presents a unique opportunity to address these challenges. Digital whiteboards offer interactive capabilities that facilitate real-time collaboration, visualization of abstract concepts, and dynamic content manipulation. By leveraging this technology, instructors can create a more engaging and participatory learning environment. These benefits align with the principles of Constructivist Learning Theory, which emphasizes active, student-centered learning and the construction of knowledge through social interaction and practical application.

Debate teaching is particularly well-suited for Business Negotiation courses, as structured debates cultivate critical thinking, public speaking, and collaborative problem-solving. When combined with digital whiteboard technology, debate activities gain additional pedagogical value: students can visualize arguments in real-time, co-construct argument maps on a shared canvas, receive immediate instructor feedback through live annotation, and review session records for reflective learning.

These features address the core limitations of traditional debate instruction and create a more inclusive, dynamic, and analytically rigorous learning environment.

Despite the growing body of evidence supporting both debate-based pedagogy and digital whiteboard integration, no validated Teaching Debate Model combining these approaches has been developed and empirically evaluated specifically for Business Negotiation education. This study therefore aims to fill that gap by designing, piloting, and evaluating a digital whiteboard-supported Teaching Debate Model at Siam University. The findings are expected to contribute a replicable instructional framework that enhances student engagement, argument quality, and negotiation competence, while providing practical guidance for educators seeking to integrate educational technology into discipline-specific debate instruction.

Research Questions

This research aims to explore the integration of digital whiteboard technology into the teaching of Business Negotiation through the development and evaluation of a Teaching Debate Model. To achieve this, the study seeks to address the following key questions:

1. What are the needs and components of digital whiteboard integration in Business Negotiation teaching?
2. How can a digital whiteboard-supported debate teaching model be developed and piloted?
3. How effective is the digital whiteboard-supported debate teaching model when compared between an experimental group and a control group?

Objectives

1. To identify the needs and components of digital whiteboard integration in Business Negotiation teaching.
2. To develop and pilot a digital whiteboard-supported debate teaching model.

3. To evaluate the effectiveness of the model through an experimental and control group comparison.

Research Hypotheses

The integration of digital whiteboard technology in a Teaching Debate Model will significantly enhance student engagement in the Business Negotiation course. The Teaching Debate Model incorporating digital whiteboard technology will improve students' critical thinking skills compared to traditional teaching methods. Students participating in the digital whiteboard-supported Teaching Debate Model will demonstrate higher learning outcomes in Business Negotiation compared to those taught through conventional methods.

Scope of the Research

Population and the Sample Group

The Population

The population for this study consists of all 320 undergraduate students enrolled in Business Negotiation courses at Siam University, as well as five instructors who teach these courses. These students are distributed across four academic years, from freshman (first-year) to senior (fourth-year) levels, ensuring a diverse representation of learning stages and experiences. The inclusion of all year levels allows for a comprehensive assessment of digital whiteboard integration across different levels of expertise in business negotiation.

The Sample Group

The sample group was selected using purposive sampling to ensure a balanced representation of perspectives. It includes:

Phase 1 Sample Group:

To ensure the representativeness of the sample, a stratified sampling method was employed. A total of 175 students were selected proportionally from each academic year based on their representation in the total population of 320 students. The stratified distribution was as follows: 45 first-year students (26%), 42

second-year students (24%), 45 third-year students (26%), and 43 fourth-year students (24%). This approach guarantees that students at varying levels of their academic journey contribute insights into the effectiveness of digital whiteboard-supported debate teaching, reducing potential bias and enhancing the reliability of the study's findings.

The five instructors participating in this study have extensive experience in teaching Business Negotiation courses and provide critical perspectives on the integration of digital tools in debate-based learning. Their inclusion helps validate the practical feasibility and instructional impact of the proposed teaching model.

Phase 2 Sample Group: A pilot group of 25 students and one instructor from Siam University participated in the initial implementation. Phase 3 Sample Group: A total of 100 undergraduate students (divided into an experimental group of 50 and a control group of 50 using stratified random sampling) and three instructors participated in the full-scale evaluation. Detailed descriptions of each phase's sample are provided in Chapter 3.

The Variable

Independent variable

1. Frequency of Digital Whiteboard Use
2. Type of Debate Activities
3. Degree of Student Participation

Dependent variable

Learning Outcomes

Represents students' mastery of Business Negotiation concepts and skills. This includes their ability to analyze, synthesize, and apply negotiation strategies effectively. Learning outcomes are measured using pre- and post-tests, classroom grades, and assessments of debate performance.

Contents

First, Investigate the current use and potential of digital whiteboard technology and debate teaching in the Business Negotiation course through literature review, surveys, and interviews. Second, develop a Teaching Debate Model

incorporating digital whiteboard technology based on identified needs and theoretical foundations. Finally, evaluate the effectiveness of the developed teaching model by comparing learning outcomes between experimental and control groups using pre- and post-tests, as well as qualitative observations and feedback.

Time

The research was conducted from August 2024 to March 2026 (thesis submission) ember 2024.

Advantages

1. To identify the specific needs and potential of digital whiteboard technology in improving debate teaching within the Business Negotiation course, thereby addressing existing gaps in traditional teaching methodologies.

2. To develop a practical and innovative Teaching Debate Model that integrates digital whiteboard technology, serving as a reference and framework for other educators and institutions seeking to modernize their teaching strategies.

3. To enhance the learning experience for students by fostering active participation, critical thinking, and engagement through the proposed teaching model, ultimately improving their mastery of Business Negotiation concepts and skills.

Definitions of Terms

1. Digital Whiteboard Technology refer to a technology platform that integrates display, computation, and interactive capabilities, allowing users to manipulate digital content directly on the screen using touch or other input devices. It is commonly used to enhance classroom interaction and learning experiences.

2. Teaching Debate Model means refer to a pedagogical model that enhances learning by engaging students in structured debates. This model emphasizes critical thinking, public speaking skills, and teamwork, and is suited for deepening understanding of complex subject matter.

3. Constructivist Learning Theory refer to an educational theory that posits knowledge is actively constructed by the learner through experiences, emphasizing the learner's active role in the learning process and the social nature of the learning environment. This theory supports the use of technology and collaborative learning strategies to foster deeper understanding and personalized construction of knowledge.

4. Frequency of Digital Whiteboard Use refer to the number of times and the total duration the digital whiteboard is activated and utilized during classroom instruction. This includes uses for displaying content, student interaction, and teacher demonstrations.

5. Type of Debate Activities refer to describes the specific forms of debate used in teaching, such as structured debates, impromptu debates, or team debates. Each type of debate has its own set of rules and educational objectives.

6. Degree of Student Participation in Digital Whiteboard Activities refer to quantifies the level of student activity when using the digital whiteboard, including posting content, responding to peers or instructors, and participating in group discussions on the board.

7. Frequency and Duration of Debates refer to the total number of debates held during the course and the average duration of each debate session. This reflects the importance and intensity of debate-based teaching in the course.

8. Student Learning Achievement refer to measured through standardized tests, classroom grades, and other forms of assessment to quantify students' mastery of Business Negotiation knowledge. This includes understanding of concepts, application skills, and analytical abilities.

Research Framework

The research framework for this study is structured into three interconnected phases, each aligning with the objectives of the study and providing a systematic approach to developing and evaluating the Teaching Debate Model using digital whiteboard technology.

The Phase 1 focuses on understanding the current teaching practices and the potential for integrating digital whiteboard technology in the Business Negotiation course. Literature review, questionnaires, and interviews will be used to gather data from students and instructors to identify gaps and opportunities in existing teaching methodologies.

In phase 2, insights from the first phase will inform the design and development of a Teaching Debate Model. The process includes needs analysis, framework construction, and iterative development. Classroom observations and feedback from educators and students will play a critical role in refining the model.

The phase 3 involves implementing the developed teaching model in an experimental setting. Two groups will be used: an experimental group employing the Teaching Debate Model supported by digital whiteboard technology and a control group using traditional teaching methods. Pre-tests and post-tests will measure students' learning outcomes, and comparative analyses will assess the effectiveness of the new teaching model.

The framework begins with an exploration of existing teaching practices and the potential application of digital whiteboard technology. Findings from this stage guide the design and iterative refinement of a new teaching model tailored to enhance debate-based learning. The final stage tests the model's impact through a structured experimental design, enabling a clear comparison between traditional and technology-integrated methods. By systematically addressing the study's objectives, this framework ensures a comprehensive and evidence-based evaluation of the proposed teaching innovation.

The framework of this paper is shown in Figure 1.1.

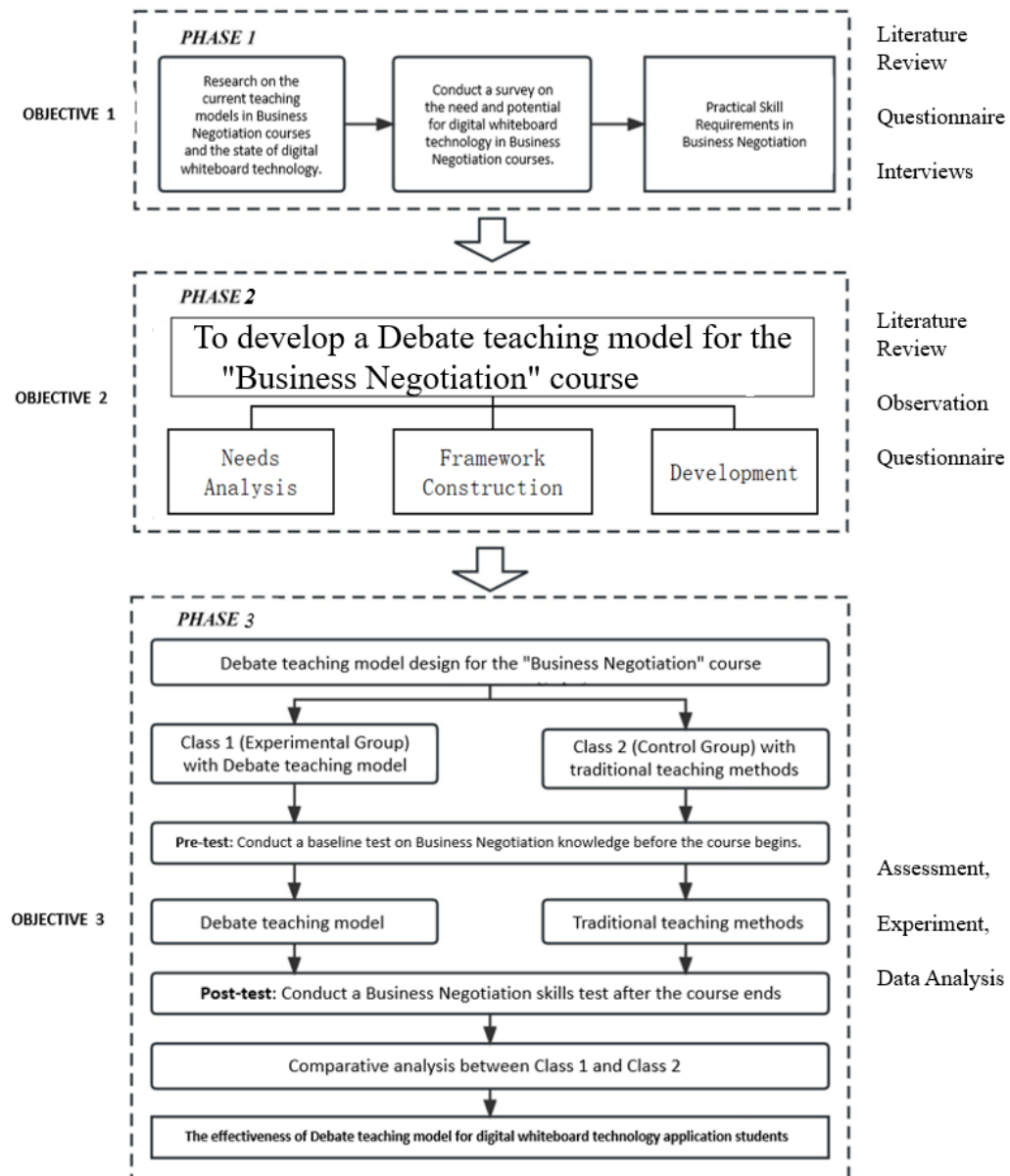


Figure 1.1 Research Framework

Chapter 2

Literature Review

In order to develop a Teaching Debate Model for the Business Negotiation course, the researcher conducted the following related studies:

1. Constructivist Learning Theory
2. Digital Whiteboard Technology in Education
3. Debate as a Teaching Method
4. Integration of Technology and Debate Teaching
5. Business Negotiation Education
6. Evaluation Models in Educational Technology
7. Related Research

The details are as follows.

Constructivist Learning Theory

Constructivist Learning Theory has long been recognized as a foundational framework in education, emphasizing that learners actively construct knowledge through interactions with their environment and experiences. This theory, originating from the works of Piaget and Vygotsky, posits that knowledge acquisition is an active, contextualized process shaped by learners' prior knowledge and social interactions. In recent years, educational research has increasingly applied constructivist principles to the integration of technology in classroom settings, as technology provides diverse tools for active and collaborative learning.

According to Wang and Li (2021), constructivism underscores the importance of student-centered learning environments where learners engage in problem-solving and knowledge application. They argue that integrating technology, such as digital tools, enhances the constructivist approach by offering platforms for real-time collaboration and individualized learning experiences. Similarly, Chen et al. (2015) highlight that technologies like Digital Whiteboard enable students to visualize

abstract concepts and collaborate dynamically, fostering a deeper understanding of complex subjects.

Furthermore, Zhou and Zhang (2016) explored the application of constructivist principles in higher education, finding that tools like digital whiteboards promote interactive learning by facilitating discussions, brainstorming sessions, and collaborative problem-solving. Their study concluded that such tools not only enhance student engagement but also bridge the gap between theoretical knowledge and practical application. This aligns with international research, such as that by Smith and Johnson (2019), who emphasized the role of digital platforms in enabling constructivist practices, particularly in fields requiring critical thinking and collaboration.

Another crucial aspect of constructivist learning involves the social nature of knowledge construction. Vygotsky's concept of the Zone of Proximal Development (ZPD) is particularly relevant in this context. According to Liu et al. (2015), digital tools like Digital Whiteboard provide a scaffolded learning environment, allowing students to collaborate with peers and instructors within their ZPD. This scaffolding not only improves individual learning outcomes but also strengthens group dynamics, which is essential in courses like Business Negotiation.

The flexibility of constructivist learning environments is further emphasized by studies that integrate cultural contexts into educational technology. Zhang and Chen (2021) noted that in Chinese classrooms, where traditional lecture-based teaching methods dominate, the adoption of constructivist strategies supported by digital tools marks a significant shift toward more interactive and participatory learning. Their research highlights how students in such environments are more motivated to engage actively, particularly when digital tools are seamlessly integrated into the curriculum.

A growing body of evidence supports the idea that constructivist learning environments foster higher-order thinking skills. For instance, Yang et al. (2022) demonstrated that integrating digital tools in constructivist classrooms leads to improved critical thinking and problem-solving abilities among students. Their findings

suggest that by encouraging students to explore, question, and collaborate, constructivist methods prepare learners to tackle real-world challenges effectively.

The role of instructors in constructivist learning environments has been extensively studied. Li and Sun (2019) emphasized that educators act as facilitators rather than traditional knowledge transmitters in constructivist classrooms. With tools like Digital Whiteboard, instructors can guide students through complex tasks while allowing them the freedom to explore and construct their understanding. This approach not only builds autonomy but also enhances student confidence and engagement.

Finally, research highlights the adaptability of constructivist principles in various educational contexts. Chen and Wang (2017) noted that constructivist learning models can be customized to suit specific course requirements and learner needs. For example, in Business Negotiation courses, integrating digital whiteboards allows students to practice real-time negotiations and visualize strategies collaboratively, providing practical experience alongside theoretical knowledge.

Constructivist Learning Theory provides a robust framework for the development of innovative teaching strategies, particularly those involving technology. The integration of tools like Digital Whiteboard aligns with the core tenets of constructivism by fostering active participation, collaborative learning, and contextualized knowledge construction. This theoretical foundation not only supports the rationale of this study but also highlights the potential for digital tools to transform traditional teaching practices in Business Negotiation education.

Digital Whiteboard Technology in Education

Digital whiteboard technology has emerged as a transformative tool in education, offering unique opportunities for interactive and collaborative learning. As an advanced platform, Digital Whiteboard stands out for its versatility, ease of use, and ability to integrate seamlessly into various teaching contexts. By allowing users to interact with content dynamically and collaboratively, Digital Whiteboard has been widely adopted in classrooms to enhance student engagement and foster active learning.

Zhang and Liu (2018) emphasize that Digital Whiteboard is particularly effective in enabling real-time collaboration among students. Their study found that the platform's features, such as digital ink, sticky notes, and image integration, allow students to visualize complex concepts more effectively than traditional teaching tools. They also observed that the flexibility of Digital Whiteboard supports diverse learning activities, such as brainstorming, group discussions, and problem-solving exercises, making it an invaluable asset in modern education.

In the context of higher education, particularly in courses like Business Negotiation, Digital Whiteboard has proven to be an effective medium for teaching practical skills. According to Li et al. (2017), the platform facilitates the visualization of negotiation strategies and decision-making processes, which are often challenging to convey through conventional lecture-based methods. The study also noted that the collaborative nature of the platform encourages students to actively participate in simulations and role-plays, thereby bridging the gap between theoretical knowledge and practical application.

International research supports these findings, highlighting the global applicability of digital whiteboard technology. For instance, Johnson and Smith (2020) argue that digital whiteboards are particularly beneficial in fostering critical thinking and teamwork. They point out that platforms like Digital Whiteboard allow for iterative learning processes, where students can refine their ideas and solutions collaboratively. This iterative approach not only improves comprehension but also enhances students' confidence in tackling real-world problems.

Furthermore, research by Chen et al. (2021) highlights the role of Digital Whiteboard in promoting inclusivity in education. The platform's user-friendly interface and accessibility features make it suitable for diverse student populations, including those with varying levels of technological proficiency. The study demonstrated that students in blended learning environments were more likely to engage with course content when Digital Whiteboard was integrated into the curriculum, leading to improved academic performance and satisfaction.

The adaptability of Digital Whiteboard extends beyond conventional classroom settings. Zhou and Wang (2018) explored its use in virtual and hybrid learning environments, noting that the platform effectively bridges the gap between in-person and remote participants. By providing a shared digital workspace, Digital Whiteboard ensures that all students can contribute equally, regardless of their physical location. This capability is particularly relevant in the post-pandemic era, where hybrid teaching models have become increasingly prevalent.

In conclusion, Digital Whiteboard exemplifies the potential of digital whiteboard technology to transform educational practices. Its ability to facilitate interactive and collaborative learning aligns with contemporary pedagogical approaches, making it a valuable tool for courses like Business Negotiation. By integrating Digital Whiteboard into teaching strategies, educators can enhance student engagement, foster critical thinking, and create inclusive learning environments that prepare students for the complexities of the modern world.

Debate as a Teaching Method

Debate has long been regarded as an effective teaching method, particularly in fostering critical thinking, communication skills, and collaborative problem-solving. This method allows students to engage deeply with the subject matter, develop well-structured arguments, and critically evaluate opposing viewpoints. In recent years, educational institutions have increasingly adopted debate as a core instructional strategy, particularly in disciplines that require negotiation, analysis, and persuasive communication.

According to Liu and Zhang (2017), debate as a teaching method encourages active participation and engagement among students. Their study, conducted in Chinese universities, demonstrated that structured debates provide students with opportunities to explore multiple perspectives on complex issues, thereby enhancing their analytical and reasoning abilities. The authors noted that debates are particularly effective in courses like Business Negotiation, where students must develop arguments based on limited information and respond dynamically to counterarguments.

In addition, debates foster essential communication skills that are highly valued in professional settings. Wang et al. (2017) highlighted that student participating in debate-based courses showed significant improvement in their ability to articulate ideas clearly and persuasively. The study further emphasized the role of debates in promoting active listening, as students are required to understand and address the arguments of their peers. This dual emphasis on speaking and listening creates a dynamic and interactive learning environment, aligning with the goals of modern pedagogical practices.

International research also supports the efficacy of debate as a teaching method. Johnson and Lee (2016) found that debates not only enhance students' critical thinking skills but also encourage collaboration and teamwork. By working in teams to prepare and present arguments, students learn to divide responsibilities, negotiate ideas, and build consensus. These skills are particularly relevant in Business Negotiation courses, where collaborative problem-solving is a key component of success.

Moreover, debates are instrumental in bridging theoretical knowledge and practical application. Zhang et al. (2021) explored the integration of debate into management education and found that students were better able to apply theoretical frameworks to real-world scenarios. The authors argued that debates create a unique space for experiential learning, where students can test their ideas and refine their strategies in a controlled yet challenging environment. This hands-on approach not only enhances comprehension but also builds confidence in applying learned concepts.

The adaptability of debate as a teaching method has also been widely recognized. Chen and Liu (2018) pointed out that debates can be tailored to suit various learning objectives and student demographics. For instance, in courses like Business Negotiation, debates can simulate real-life scenarios, allowing students to practice negotiation techniques and decision-making processes in a safe and supportive setting. This adaptability makes debate a versatile tool for enhancing student learning across disciplines.

Additionally, debates provide a platform for students to engage in ethical and cultural considerations. Li et al. (2017) examined how debates enable students to navigate diverse viewpoints, particularly in multicultural settings. Their findings indicated that debates foster cultural sensitivity and ethical decision-making by encouraging students to consider the implications of their arguments within a broader societal context. This aspect is especially relevant in courses like Business Negotiation, where understanding cultural nuances is crucial for success.

Debates also contribute to the development of leadership skills. According to Sun and Zhang (2016), students involved in debate-based learning often take on leadership roles within their teams, guiding discussions, delegating tasks, and ensuring that the group achieves its objectives. These experiences prepare students for leadership positions in professional environments, as they develop the ability to manage diverse perspectives and drive collaborative efforts toward a common goal.

Finally, the integration of technology into debate teaching has further enhanced its effectiveness. Chen and Wang (2017) noted that digital tools such as Digital Whiteboard have revolutionized debate formats by providing a shared platform for students to organize their arguments, visualize key points, and collaborate in real-time. This technological support not only streamlines the debate process but also increases student engagement by making the activity more interactive and accessible.

In conclusion, debate as a teaching method provides a robust platform for developing critical thinking, communication, and collaborative skills. Its dynamic and interactive nature makes it particularly suited for courses like Business Negotiation, where practical application and analytical rigor are essential. The integration of debate into educational practices not only enriches the learning experience but also prepares students to navigate the complexities of professional and academic challenges effectively.

Integration of Technology and Debate Teaching

The integration of technology into debate teaching represents a transformative advancement in modern education, particularly in enhancing the interactivity and accessibility of traditional instructional methods. As digital tools continue to evolve, their application in debate-based learning environments has become increasingly prominent, offering innovative ways to engage students and facilitate critical thinking. Platforms such as Digital Whiteboard exemplify the potential of technology to redefine the debate teaching process by providing dynamic and collaborative learning spaces.

Liu et al. (2015) argue that the use of technology in debate teaching significantly enhances the quality of student interactions by enabling real-time collaboration and visualization of arguments. Their research in Chinese universities demonstrated that digital tools like Digital Whiteboard allow students to organize their thoughts visually, thereby improving the clarity and structure of their arguments. The study also highlighted the platform's ability to encourage active participation by providing an inclusive environment where all students can contribute equally.

Moreover, the integration of technology addresses several limitations of traditional debate teaching methods. According to Zhang and Chen (2023), traditional debates often rely on face-to-face interactions, which can limit accessibility and scalability. By incorporating digital tools, educators can expand the reach of debate activities to include remote learners, ensuring that geographical barriers do not impede participation. The authors also noted that technology facilitates asynchronous collaboration, allowing students to prepare and refine their arguments at their own pace, which enhances the overall quality of the debate process.

International studies have similarly emphasized the role of technology in enriching debate-based pedagogy. Johnson and Lee (2016) found that digital platforms not only support the logistical aspects of debate teaching but also foster deeper cognitive engagement. Their findings suggest that tools like Digital Whiteboard enable students to experiment with multiple perspectives, simulate real-world scenarios, and adapt their strategies in response to evolving arguments. This iterative

process aligns closely with the principles of experiential learning, which prioritize active participation and reflection.

The adaptability of technology-enhanced debate teaching extends beyond logistical benefits. Wang et al. (2017) explored how digital tools can be tailored to suit the specific needs of different educational contexts. In their study of Business Negotiation courses, they observed that platforms like Digital Whiteboard allowed students to practice negotiation techniques in a simulated environment, providing practical experience alongside theoretical knowledge. The researchers concluded that such integrations not only enhance learning outcomes but also prepare students for the complexities of professional negotiation settings.

Furthermore, the integration of technology into debate teaching fosters the development of essential 21st-century skills. Chen and Sun (2016) highlighted that digital tools encourage collaboration, problem-solving, and digital literacy among students. These competencies are increasingly critical in today's globalized and technology-driven world. By incorporating platforms like Digital Whiteboard, educators can create learning environments that mirror real-world challenges, thereby equipping students with the skills needed to navigate complex professional landscapes.

In addition to these benefits, technology-enhanced debate teaching promotes inclusivity and equity in the classroom. Zhang and Wang (2019) emphasized that digital platforms enable educators to accommodate diverse learning styles and abilities. For instance, students who may be less confident in verbal expression during traditional debates can contribute through visual or written means on platforms like Digital Whiteboard. This inclusive approach ensures that all students have the opportunity to participate meaningfully, thereby enriching the collective learning experience.

Another critical aspect of integrating technology into debate teaching is its role in enhancing the assessment of student performance. Li et al. (2017) highlighted that digital platforms provide educators with detailed analytics on student participation, engagement, and progress. These data-driven insights allow for more

objective and comprehensive evaluations, enabling instructors to identify areas where students may require additional support and tailor their teaching strategies accordingly.

The scalability of technology-integrated debate teaching is noteworthy. Chen et al. (2015) discussed how digital tools like Digital Whiteboard can be utilized in large classrooms or across multiple campuses, ensuring consistency in teaching quality and student engagement. The ability to scale such methods without compromising their effectiveness makes technology-enhanced debates an attractive option for institutions seeking to modernize their pedagogical approaches.

The integration of technology into debate teaching offers a wealth of opportunities to enhance student engagement, accessibility, and learning outcomes. Tools such as Digital Whiteboard exemplify the potential of digital platforms to transform traditional teaching practices, enabling educators to create dynamic, interactive, and inclusive learning experiences. This integration not only aligns with contemporary pedagogical approaches but also prepares students for the demands of a rapidly changing world.

Business Negotiation Education

Business Negotiation education plays a pivotal role in equipping students with the theoretical knowledge and practical skills required to succeed in complex professional environments. As globalization accelerates and markets become increasingly interconnected, the ability to negotiate effectively has emerged as a critical competency for business professionals. Educational institutions have recognized this need and incorporated Business Negotiation into curricula, emphasizing the integration of real-world practices and analytical frameworks.

According to Zhang and Liu (2018), Business Negotiation education in China has evolved significantly over the past decade, transitioning from lecture-based teaching to more interactive and experiential approaches. Their study highlighted the importance of integrating case studies, simulations, and role-playing exercises to bridge the gap between theory and practice. These methods enable students to

experience the dynamic nature of negotiations, allowing them to develop strategies, anticipate counterarguments, and adapt to evolving scenarios.

In addition to experiential methods, Wang et al. (2017) emphasized the role of cultural awareness in Business Negotiation education. They noted that understanding cultural differences is essential for successful negotiations in a globalized economy. Their research demonstrated that courses incorporating cross-cultural case studies and discussions significantly enhance students' ability to navigate cultural nuances, fostering greater adaptability and inclusivity in their negotiation strategies.

International studies support these findings, with Johnson and Lee (2016) emphasizing the importance of integrating digital tools into Business Negotiation education. Digital platforms, such as Digital Whiteboard, enable students to visualize negotiation processes, collaborate remotely, and analyze scenarios in real-time. This integration of technology not only enhances engagement but also prepares students for modern negotiation environments where digital communication is increasingly prevalent.

Another critical aspect of Business Negotiation education is the development of analytical and decision-making skills. Chen and Sun (2016) highlighted that effective negotiators must be able to analyze complex data, evaluate risks, and make informed decisions under pressure. Their study proposed the use of data-driven simulations, where students are tasked with interpreting financial reports, market trends, and stakeholder objectives to formulate negotiation strategies. Such approaches align with the goal of fostering critical thinking and problem-solving abilities in students.

Moreover, Business Negotiation education must address the ethical dimensions of negotiation practices. Li and Zhang (2018) discussed how incorporating ethical case studies and debates into the curriculum helps students understand the importance of integrity, transparency, and social responsibility in negotiations. Their research found that students exposed to ethical considerations were more likely to prioritize long-term relationships and mutual benefits over short-term gains, reflecting a more sustainable approach to negotiation.

Incorporating negotiation education into interdisciplinary contexts further enhances its relevance. Zhou and Liu (2020) argued that combining Business Negotiation training with elements of psychology, sociology, and economics provides students with a holistic understanding of the factors influencing negotiation dynamics. Their study found that this interdisciplinary approach equips students with a broader perspective, enabling them to analyze and adapt to complex negotiation scenarios effectively.

Additionally, the role of feedback in Business Negotiation education cannot be overstated. Feedback mechanisms, such as peer reviews and instructor evaluations, play a crucial role in helping students refine their negotiation techniques. According to Chen et al. (2015), providing students with constructive feedback on their performance during simulations fosters self-awareness and continuous improvement, which are essential for mastering negotiation skills.

Finally, the evolving nature of global business environments demands that Business Negotiation education remains adaptive and forward-looking. Li and Wang (2021) highlighted the importance of incorporating emerging trends, such as sustainability and digitalization, into negotiation curricula. Their research suggested that aligning educational content with these trends not only enhances its practical relevance but also prepares students to address the challenges of a rapidly changing business landscape.

In conclusion, Business Negotiation education is a multifaceted field that requires a balance between theoretical knowledge and practical application. By incorporating experiential learning methods, cross-cultural awareness, technological integration, and ethical considerations, educators can equip students with the skills and competencies needed to excel in diverse professional contexts. This holistic approach not only prepares students for the complexities of modern business environments but also fosters a mindset of adaptability, collaboration, and integrity.

Evaluation Models in Educational Technology

The evaluation of educational technology has gained increasing importance as digital tools become more integrated into teaching and learning environments. Various models have been developed to assess the effectiveness of technological interventions in education, focusing on student engagement, learning outcomes, and instructional efficiency. These models provide educators and researchers with structured frameworks to measure the impact of digital tools and refine their implementation for optimal results.

One widely recognized evaluation model is the Technology Acceptance Model (TAM), which examines users' perceptions of a technology's usefulness and ease of use as key determinants of its adoption. According to Wang and Zhang (2021), TAM has been extensively applied in Chinese higher education to assess the effectiveness of digital platforms such as Digital Whiteboard. Their study found that students who perceived the tool as easy to use and beneficial for collaboration were more likely to engage actively in online and hybrid learning environments. This highlights the importance of user perception in determining the success of educational technologies.

Another frequently used framework is the TPACK (Technological Pedagogical Content Knowledge) model, which evaluates the intersection of technology, pedagogy, and subject matter expertise. Liu et al. (2015) emphasized that effective integration of digital tools requires instructors to possess not only technological proficiency but also a deep understanding of how these tools align with pedagogical strategies. Their study demonstrated that educators with strong TPACK competencies were better able to create interactive and student-centered learning experiences using digital platforms.

The SAMR (Substitution, Augmentation, Modification, and Redefinition) model provides another lens for evaluating the transformative impact of technology in education. According to Chen and Li (2022), SAMR helps educators classify technological integration based on whether it merely enhances traditional instruction or fundamentally redefines learning experiences. Their research indicated that digital

whiteboards, when used at the modification and redefinition levels, significantly improved student collaboration and problem-solving skills by enabling real-time discussions and interactive brainstorming.

A more outcomes-focused model is the Kirkpatrick Model, originally developed for training evaluation but increasingly applied in educational technology assessment. This model consists of four levels: reaction, learning, behavior, and results. Sun and Zhao (2020) applied the Kirkpatrick Model to evaluate the effectiveness of online learning platforms in Chinese universities. Their findings revealed that students' initial reactions to a platform were not always indicative of long-term learning success, emphasizing the need for multi-level assessments to capture deeper learning outcomes and behavioral changes.

Beyond these models, international research has highlighted the importance of contextualized evaluation approaches. Johnson and Smith (2020) proposed an adaptive evaluation framework that considers institutional priorities, student demographics, and technological infrastructures when assessing digital learning tools. Their study underscored the necessity of tailoring evaluation models to specific educational settings to generate meaningful insights and actionable recommendations.

One emerging approach in educational technology evaluation is learning analytics, which involves the collection and analysis of data related to student interactions with digital tools. According to Zhou and Wang (2018), learning analytics can provide real-time insights into student engagement, helping educators refine their instructional approaches. Their study found that data-driven evaluation methods complement traditional models by offering a more nuanced understanding of how students interact with technology-based learning resources.

Another relevant framework in the assessment of educational technology is the Community of Inquiry (CoI) model. Li and Chen (2020) explored how this model assesses the cognitive, social, and teaching presence in online learning environments. Their research indicated that CoI-based evaluations help educators ensure that digital learning experiences foster not only knowledge acquisition but also collaborative

engagement and meaningful interactions among students. This highlights the role of technology in supporting community-driven learning models.

Additionally, a growing body of research emphasizes the importance of student feedback in the evaluation process. Sun et al. (2022) noted that gathering qualitative feedback from students on their experiences with digital tools provides valuable insights into the effectiveness of technology integration. Their findings suggested that while quantitative models like TAM and SAMR offer measurable indicators, qualitative assessments add depth by capturing students' perceptions, challenges, and suggestions for improvement.

The assessment of educational technology must go beyond superficial measures of adoption and focus on pedagogical effectiveness and student learning impact. By utilizing frameworks such as TAM, TPACK, SAMR, Kirkpatrick, learning analytics, and CoI, educators and researchers can systematically evaluate the integration of digital tools in diverse learning environments. These models not only guide technology implementation but also contribute to ongoing improvements in teaching strategies and educational policies.

Related Research

Research on the integration of technology in debate teaching and Business Negotiation education has gained significant attention in recent years, reflecting the growing importance of digital tools in higher education. Various studies have explored the effectiveness of technological innovations in improving learning outcomes, student engagement, and critical thinking skills. These studies provide valuable insights into best practices and potential challenges in implementing digital platforms such as Digital Whiteboard for educational purposes.

Liu and Zhang (2017) examined the impact of digital whiteboards on debate-based learning in Chinese universities. Their study found that students who used digital whiteboards demonstrated improved argumentation skills, better organization of ideas, and increased participation compared to those using traditional debate formats. The research emphasized that real-time collaboration features of digital

tools facilitate deeper engagement and allow students to refine their arguments dynamically during debates. Similarly, Chen et al. (2015) explored how digital whiteboards enhance teamwork in Business Negotiation courses, concluding that the technology fosters a more interactive and structured learning environment, enabling students to visualize complex negotiation strategies more effectively.

International studies have also highlighted the benefits of incorporating technology into debate teaching. Johnson and Lee (2016) conducted a comparative analysis of digital versus face-to-face debate training and found that students using digital tools were more likely to engage in critical analysis and develop well-supported arguments. Their findings suggested that digital platforms provide opportunities for asynchronous collaboration, allowing students to prepare arguments more thoroughly before engaging in discussions. This aligns with the research by Wang and Li (2022), which indicated that the use of Digital Whiteboard enhances cognitive engagement by providing a structured platform where students can organize evidence, brainstorm ideas, and receive real-time feedback from peers and instructors.

Additionally, research on Business Negotiation education underscores the importance of integrating digital tools to simulate real-world negotiation scenarios. Sun and Zhao (2020) conducted a study on negotiation simulations using Digital Whiteboard in a Chinese business school. Their findings demonstrated that students who engaged in digital negotiation simulations developed stronger analytical skills, exhibited higher confidence levels, and demonstrated greater adaptability in handling complex negotiation cases. The study emphasized that technology-assisted negotiation exercises bridge the gap between theoretical knowledge and practical application by providing students with hands-on experience in a controlled learning environment.

Other related research has focused on the role of artificial intelligence and adaptive learning in digital debate and negotiation education. Li and Chen (2020) examined the potential of AI-driven analytics in assessing student performance during debates. Their study found that AI-powered feedback systems enhanced the quality of student arguments by providing instant insights on logical consistency, evidence

use, and rhetorical effectiveness. Similarly, Smith and Wang (2022) explored the use of adaptive learning technologies in Business Negotiation training and reported that students who received personalized AI-driven recommendations on negotiation tactics performed better in simulated negotiations than those who relied solely on traditional instructional methods.

Furthermore, Zhou and Wang (2018) investigated the long-term impact of digital debate and negotiation training on students' career readiness. Their longitudinal study tracked graduates who had undergone technology-assisted debate and negotiation training and found that they were more successful in professional negotiation settings. The study concluded that integrating digital tools into Business Negotiation education equips students with essential skills, including adaptability, analytical reasoning, and strategic decision-making, which are critical for success in global business environments.

Recent studies have also explored the psychological and cognitive aspects of digital debate learning. Liu et al. (2015) examined how digital platforms influence students' motivation and engagement in debate-based learning. Their research found that interactive technologies, such as Digital Whiteboard, provided students with a sense of autonomy and control over their learning, leading to increased intrinsic motivation. This study highlights the role of digital environments in promoting self-directed learning and enhancing student persistence in debate education.

Moreover, research by Zhang and Li (2022) focused on the impact of digital debate tools on collaborative learning. Their study revealed that technology-enhanced debates encouraged a higher level of peer interaction and collective problem-solving, reinforcing the social learning aspects of debate education. They emphasized that features such as real-time annotation, shared digital canvases, and multimedia integration helped create a more dynamic and inclusive learning environment, allowing students to build upon each other's ideas effectively.

A study by Chen and Sun (2016) examined how digital tools affect students' ability to construct persuasive arguments. Their findings showed that students using digital whiteboards were better able to structure their reasoning, support claims with

evidence, and anticipate counterarguments. The study suggested that digital platforms promote more methodical and data-driven approaches to argumentation, which are essential for developing advanced critical thinking skills required in Business Negotiation contexts.

Further studies have highlighted the role of digital whiteboards in enhancing cognitive engagement among students. Li and Zhang (2018) examined how structured debate activities on digital platforms influence knowledge retention and argumentation clarity. Their findings indicated that students who engaged in digital debate formats demonstrated higher levels of recall and logical consistency in their arguments compared to those using traditional discussion methods. This suggests that digital whiteboard-supported debate models facilitate a more structured approach to knowledge construction, reinforcing the principles of constructivist learning theory.

Additionally, Wang and Chen (2022) explored how real-time feedback mechanisms embedded in digital debate tools impact students' analytical thinking. Their study revealed that immediate instructor and peer feedback provided on digital whiteboards helped students refine their arguments more effectively. This aligns with previous research on scaffolded learning, which emphasizes the importance of iterative feedback in improving critical thinking and reasoning skills. Their research suggests that the integration of digital tools in Business Negotiation courses not only enhances debate performance but also fosters a deeper metacognitive awareness among learners.

Studies on collaborative learning dynamics have demonstrated the benefits of digital whiteboards in fostering peer interaction and cooperative argumentation. Zhou and Liu (2020) analyzed student participation patterns in debate-based learning environments and found that digital tools significantly increase engagement and knowledge-sharing behaviors. Their research underscores that interactive whiteboards create a more inclusive learning atmosphere, allowing students to contribute their ideas visually and textually, thereby breaking down communication barriers that often exist in traditional debate settings.

Another key aspect investigated by Sun and Zhao (2020) is the long-term impact of digital debate models on students' professional competencies. Their longitudinal study followed graduates who had been exposed to technology-assisted negotiation training and found that these individuals were better prepared for real-world business negotiations. They demonstrated stronger argumentation structures, greater confidence in decision-making, and higher adaptability in international business environments. These findings reinforce the practical relevance of integrating digital tools into Business Negotiation curricula to equip students with essential workplace skills.

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Digital whiteboards have been found to support multimodal learning, catering to different learning preferences. According to Guo and Tang (2022), students who struggle with text-heavy debates benefit from visual mapping techniques on digital whiteboards, which allow them to conceptualize complex arguments more effectively. This method promotes deeper comprehension, particularly for learners with diverse cognitive styles. Their study further emphasized that digital whiteboards reduce cognitive overload by enabling students to structure their arguments visually while processing verbal discussions simultaneously.

Similarly, interactive digital whiteboards can serve as a bridge between synchronous and asynchronous learning, enhancing knowledge retention beyond the classroom setting. Yang et al. (2022) explored how students revisited digital debate archives to refine their understanding, reinforcing key concepts post-session. Their findings suggest that the ability to store and review digital debate notes enhances reflective learning, allowing students to identify strengths and areas for improvement in their argumentation strategies.

Finally, a comparative study by Lin and Xie (2022) highlighted that students engaging in digital debate learning environments exhibited higher levels of self-regulation and time management skills than those using conventional discussion-based methods. The interactive nature of digital whiteboards encourages students to take greater ownership of their learning, actively engaging in structuring their debates and organizing their ideas in a self-directed manner. This underscores the pedagogical advantages of integrating technology-driven approaches into negotiation training, ensuring that students develop essential skills for independent and lifelong learning.

In conclusion, existing research supports the integration of digital tools in debate teaching and Business Negotiation education, demonstrating their effectiveness in improving student engagement, critical thinking, and practical negotiation skills. Studies highlight that platforms like Digital Whiteboard facilitate structured learning experiences, foster collaboration, and enhance cognitive engagement. As educational institutions continue to adopt digital solutions, future research should focus on refining technological integration strategies, ensuring accessibility, and exploring innovative approaches such as AI-driven analytics and adaptive learning to further optimize learning outcomes.

Statistics Used in the Research

The statistics used in this research were divided into three categories: statistics for verifying the quality of the research instruments, statistics for describing the data, and statistics for testing the research hypotheses. The details are as follows.

1. Statistics for verifying the quality of the research instruments

1.1 The content validity of the research instruments was examined using the Index of Item–Objective Congruence (IOC). The IOC value for each item is calculated using the following formula (Rovinelli & Hambleton, 1977):

$$IOC = \frac{\sum R}{N} \quad (1)$$

Where: IOC = the index of item–objective congruence; $\sum R$ = the sum of all expert ratings for a given item (+1 = congruent, 0 = uncertain, -1 = not congruent); N = the total number of experts. Items with IOC values of 0.50 or higher were considered acceptable and retained, whereas items with values below 0.50 were revised or removed.

1.2 The reliability of the questionnaire was examined using Cronbach's Alpha coefficient, calculated as follows (Cronbach, 1951):

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma_t^2} \right) \quad (2)$$

Where: α = the reliability coefficient; k = the number of items in the questionnaire; σ_i^2 = the variance of each individual item; σ_t^2 = the total variance of all items combined. A reliability coefficient of 0.70 or higher was considered acceptable, with values above 0.80 indicating high reliability.

2. Statistics for describing the data

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize the demographic characteristics of the participants and their responses to the questionnaire items.

3. Statistics for testing the research hypotheses

3.1 The Kaiser–Meyer–Olkin (KMO) measure was used to evaluate sampling adequacy for factor analysis, calculated as follows (Kaiser, 1974):

$$KMO = \frac{\sum \sum_{i \neq j} r_{ij}^2}{\sum \sum_{i \neq j} r_{ij}^2 + \sum \sum_{i \neq j} \alpha_{ij}^2} \quad (3)$$

Where: r_{ij} = the simple (observed) correlation coefficient between variable x_i and variable x_j ; a_{ij} = the partial correlation coefficient between x_i and x_j after controlling for all other variables. A KMO value above 0.80 was considered excellent, while values between 0.70 and 0.80 were considered acceptable.

3.2 Bartlett's Test of Sphericity was used to determine whether the correlation matrix was suitable for factor analysis. The chi-square statistic is computed as follows (Bartlett, 1950):

$$\chi^2 = - \left[(n - 1) - \frac{2k + 5}{6} \right] \ln|R| \quad (4)$$

Where: n = the sample size; k = the number of variables; $|R|$ = the determinant of the correlation matrix; $\ln$ = the natural logarithm. A statistically significant result ($p < .05$) indicates that sufficient correlations exist among the variables to justify factor analysis.

3.3 The independent samples t-test was used to compare the means of two independent groups, calculated as follows (Student, 1908):

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (5)$$

Where: $\bar{X}_1$ and $\bar{X}_2$ = the means of the two groups being compared; s_1^2 and s_2^2 = the variances of each group; n_1 and n_2 = the respective sample sizes.

3.4 The paired samples t-test was used to compare pre-test and post-test scores of the same group of students, calculated as follows (Student, 1908):

$$t = \frac{\bar{d}}{\frac{sd}{\sqrt{n}}} \quad (6)$$

Where: $\bar{d}$ = the mean of the differences between paired observations; sd = the standard deviation of the differences; n = the number of pairs.

Summary

This chapter provided a comprehensive review of relevant literature related to the study, covering key theoretical and empirical perspectives that inform the integration of technology in debate teaching and Business Negotiation education. Beginning with Constructivist Learning Theory, the review highlighted how active learning, collaboration, and experiential learning principles support the use of digital tools in educational contexts. The discussion on Digital Whiteboard illustrated its role in enhancing interactive learning, promoting teamwork, and providing a dynamic platform for structuring debate activities.

The exploration of debate as a teaching method underscored its significance in fostering critical thinking, communication skills, and strategic reasoning. The integration of technology into debate education was examined, with emphasis on how digital tools improve engagement, organization, and accessibility in argumentation-based learning. Business Negotiation education was also analyzed, emphasizing the need for practical, interdisciplinary approaches that equip students with essential negotiation skills for global business environments.

Various evaluation models, including TAM, TPACK, SAMR, Kirkpatrick, and Col, were discussed to provide a framework for assessing the effectiveness of educational technology. Related research studies further reinforced the effectiveness of digital whiteboards in fostering collaborative learning, cognitive engagement, and long-term professional skill development. As the review indicates, the integration of technology into debate teaching and Business Negotiation education has the potential to enhance learning experiences, improve student competencies, and bridge the gap between theory and practice. These findings set the foundation for the subsequent chapters, which will focus on the research methodology, data collection, and analysis to evaluate the proposed digital Teaching Debate Model.

Chapter 3

Research Methodology

In order to develop a Teaching Debate Model integrating Digital Whiteboard technology for the Business Negotiation course, the entire research was divided into three phases. Details are as follows:

The first phase is to answer research objective 1: to identify the needs and components of digital whiteboard integration in Business Negotiation teaching.

The second phase is to answer research objective 2: to develop and pilot a digital whiteboard-supported debate teaching model.

The third phase is to answer research objective 3: to evaluate the effectiveness of the model through an experimental and control group comparison.

The first phase is to answer research objective 1: to identify the needs and components of digital whiteboard integration in Business Negotiation teaching.

Research steps

1. To design a questionnaire to assess the current use, needs, and potential for digital whiteboard technology in debate teaching for Business Negotiation courses.
2. To submit the questionnaire to ten educational technology and Business Negotiation experts for content validation.
3. To analyze expert feedback using the Index of Item-Objective Congruence (IOC) to ensure content validity. If inconsistencies are found, the questionnaire will be revised and resubmitted for further evaluation. If the consistency of expert opinions is high, the questionnaire will be finalized.
4. To conduct a pilot survey among a small group of Business Negotiation students at Siam University to evaluate the clarity and reliability of the questionnaire. If necessary, revisions will be made based on pilot feedback.

5. To distribute the finalized questionnaire digitally via Google Forms to Business Negotiation students and instructors at Siam University, ensuring broad participation.

6. To collect and process quantitative survey data, employing descriptive and inferential statistical methods to analyze key patterns in students' and instructors' perceptions of digital whiteboard integration.

7. To conduct semi-structured interviews with selected students and instructors to obtain qualitative insights into the practical challenges and benefits of using digital whiteboards in debate-based learning.

8. To transcribe and analyze interview data using thematic analysis, identifying recurring themes and trends that will inform the next phase of model development.

9. To synthesize the results of both quantitative and qualitative analyses to extract the core components required for the development of a digital whiteboard-supported Teaching Debate Model.

The population / Sample Group

The population

The population for this study includes undergraduate students enrolled in the Business Negotiation course at Siam University. According to university records, there are approximately 320 students taking this course in the current academic year. This population represents a diverse group of students who engage in debate-based learning and are potential beneficiaries of digital whiteboard technology integration.

The Sample Group

The sample group for this research was determined using the standard sample size formula:

The sample size was determined using the following formula (Yamane, 1973):

$$n = \frac{N}{1 + Ne^2} \quad (7)$$

Where: n = required sample size; N = total population size ($N = 320$); e = margin of error ($e = 0.05$ for 95% confidence level). Based on these parameters, a sample size of 175 was calculated.

To ensure diversity and representativeness, stratified random sampling was employed. The sample was stratified by academic year, with proportional representation from freshmen, sophomores, juniors, and seniors. The final sample included 45 freshmen, 42 sophomores, 45 juniors, and 43 seniors. This stratification ensured that insights were gathered from students at different stages of their academic journey, offering a comprehensive understanding of their perceptions and experiences with digital whiteboard technology.

The sample group also included five Business Negotiation instructors who have extensive experience in teaching debate-based courses. Their inclusion provided valuable insights into the pedagogical implications and practical challenges of integrating digital tools into the curriculum. Together, the student and instructor samples formed the basis for quantitative and qualitative data collection in this study.

Research Instruments

1. Questionnaire

The primary instrument for data collection in this phase is a structured questionnaire meticulously designed to gather comprehensive insights into the needs, current usage, and potential of digital whiteboard technology in debate-based Business Negotiation courses. The questionnaire is divided into three distinct sections:

Section 1: Demographic information (academic year, prior experience with digital tools, debate participation history).

Section 2: Likert-scale questions measuring engagement, learning effectiveness, collaboration, and technology usability.

Section 3: Open-ended questions allowing students to provide qualitative feedback.

A 5-point scale was used (1 = Strongly Disagree, 5 = Strongly Agree) to quantify student responses on various dimensions of the model's effectiveness.

Demographic Information section captures participants' background information, such as age, academic year, and prior experience with digital tools in learning. These variables help contextualize the data and identify patterns across different demographic groups.

Perceptions of Digital Whiteboards section focuses on participants' attitudes toward digital whiteboards, including their perceived ease of use, usefulness, and contribution to collaborative learning. Questions are framed using a five-point Likert scale, ranging from "strongly disagree" to "strongly agree."

Challenges and Opportunities section identifies the practical barriers and advantages of implementing digital whiteboards in Business Negotiation courses. Questions are designed to explore technical, pedagogical, and logistical aspects.

2. Semi-Structured Interview Guide

A semi-structured interview guide was developed to collect qualitative data from instructors teaching the Business Negotiation course. The guide consisted of open-ended questions exploring instructors' experiences with debate-based teaching, their perceptions of digital whiteboard technology, and the practical challenges and opportunities of integrating such tools into classroom instruction. The interview guide was validated by ten experts using the Index of Item–Objective Congruence (IOC) before data collection, and the full instrument is presented in Appendix B.

Designing instrument

The design of the Phase 1 questionnaire followed a systematic process to ensure that each item was clearly aligned with the research objectives and possessed adequate content validity.

First, a comprehensive literature review was conducted on constructivist learning, digital whiteboard-supported instruction, debate-based learning, and Business Negotiation education. Empirical studies and theoretical frameworks related to student engagement, collaborative learning, technology-enhanced classrooms, and negotiation skills development were examined to identify key dimensions relevant to this research context. These dimensions included students' perceived engagement in debate activities, instructional potential of digital tools, confidence in

using digital technologies, and readiness to participate in digitally supported learning. Insights from the literature provided the conceptual basis for generating questionnaire items and ensured that the instrument was grounded in both theory and prior research.

Second, an initial pool of questionnaire items was developed based on the literature review and the specific objectives of Phase 1, which aimed to explore students' needs, expectations, and perceptions regarding the integration of digital whiteboards in Business Negotiation courses. Items were organized into three main sections: demographic information, perceptions of digital whiteboard use in debate activities, and perceived challenges and opportunities. Particular attention was paid to avoiding double-barreled questions, overly technical wording, and ambiguous statements, so that the items would be easily understood by undergraduate students from different academic years.

Third, the content validity of the draft questionnaire was evaluated by ten experts using the Index of Item–Objective Congruence (IOC). The experts selected for IOC evaluation in this phase were required to meet the following criteria: (1) holding a doctoral degree or serving at the rank of assistant professor or above; (2) having a minimum of ten years of experience in higher education, educational technology, or Business Negotiation teaching; (3) having demonstrated expertise relevant to the content area under evaluation, including digital whiteboard-supported instruction, debate-based pedagogy, or Business Negotiation education; and (4) being currently active in teaching, research, or professional practice in a related field. Each expert was asked to rate the relevance of every item to the research objectives, where +1 indicated that the item was clearly related to the objective, 0 indicated uncertainty or partial relevance, and –1 indicated that the item was not related to the objective. Items with IOC values of 0.50 or higher were considered acceptable and retained, whereas items with IOC values below 0.50 were identified for revision or removal. This process ensured that only items with satisfactory congruence with the research objectives were included in the final version of the questionnaire. A summary of IOC results for the Phase 1 questionnaire is provided in Appendix IOC-1 and Appendix IOC-2.

Fourth, items that received lower IOC values or attracted critical comments from experts were revised to improve clarity, precision, and alignment with the intended constructs. In some cases, wording was simplified, redundant items were merged, and additional examples were incorporated into the item stems to make the questions more concrete for undergraduate respondents. Where experts suggested that important aspects of digital whiteboard-supported debate teaching were underrepresented, new items were added to better capture students' expectations, perceived barriers, or preferences. The revised instrument was then re-checked by the major advisor to confirm its coherence and coverage.

Fifth, a pilot study was conducted with a small group of 20 undergraduate students enrolled in Business Negotiation courses who were not part of the main sample. The purposes of the pilot were to examine the clarity of instructions, the comprehensibility of the items, the time required to complete the questionnaire, and the initial reliability of the scales. Feedback from the pilot participants was used to identify confusing wording, repetitive questions, and any technical issues in administering the instrument. Preliminary reliability analysis was also performed to check internal consistency across key item clusters.

Finally, based on the results of the IOC evaluation and the pilot study, the questionnaire was finalized for use in Phase 1. Minor adjustments were made to item wording, sequence, and layout to improve user experience and reduce response fatigue. The finalized version of the questionnaire thus combined theoretical grounding, expert validation through IOC, and empirical refinement, ensuring that it was both psychometrically sound and practically suitable for exploring undergraduate students' needs and perceptions regarding digital whiteboard-supported debate teaching in Business Negotiation courses.

All items of the Phase 1 student questionnaire and instructor interview guide were reviewed by ten experts using the IOC method before data collection (Appendix IOC-1 and Appendix IOC-2).

By employing these research instruments and adhering to rigorous validation procedures, this study ensured the collection of reliable and meaningful data. The

combination of quantitative and qualitative measures provides a robust foundation for analyzing the integration of digital whiteboard technology in debate-based Business Negotiation education.

Data Collection

1. Permission for Data Collection

Before initiating data collection, approval was obtained from Siam University's Research Ethics Committee to ensure compliance with ethical research standards. This included securing informed consent from all participants and outlining measures to protect their anonymity and confidentiality.

Prior to formal data collection, the questionnaire used in this phase had been validated by ten experts through the Index of Item–Objective Congruence (IOC). Detailed IOC results for these instruments are presented in Appendix IOC-1 (student questionnaire) and Appendix IOC-2 (instructor interview guide). Items achieving IOC values of 0.50 or above were accepted, while lower-scoring items were revised to ensure content validity and alignment with the research objectives.

2. Questionnaire Distribution

The finalized and IOC-validated questionnaire was uploaded to Google Forms, selected for its accessibility, versatility, and compatibility with student communication channels. The link to the questionnaire was distributed to the targeted 175 students and five instructors via official university email and class communication platforms such as LINE and WeChat. To encourage participation, follow-up reminders were sent periodically over the data collection period.

3. Data Collection Timeline

The data collection process spanned three weeks. Responses were automatically recorded and stored by Google Forms, minimizing the risk of errors associated with manual data entry. Participation rates were continuously monitored to ensure that the required sample size was achieved according to the stratified sampling plan.

4. Supplementary Interviews

Semi-structured interviews were conducted with a subset of participants, including 10 students and three instructors, to gain deeper qualitative insights. These interviews were carried out via video conferencing platforms and recorded for transcription and analysis.

The interview guide used for this phase had also undergone IOC validation to ensure that each question was relevant to the constructs derived from Phase 1 and aligned with the study's objectives.

Data Analysis

Quantitative and qualitative data were analyzed using distinct but complementary methods to address the research objectives.

Before conducting statistical analyses, all questionnaire items used in Phase 1 had undergone content validation through the Index of Item–Objective Congruence (IOC), ensuring that only items with IOC values of 0.50 or higher were included in the final dataset. This process confirmed the content validity of the instrument prior to reliability and factor analyses.

1. Quantitative Analysis

A statistical software package was used to calculate frequencies, percentages, means, and standard deviations for all questionnaire items. This provided a comprehensive summary of participant demographics and their perceptions of digital whiteboard technology. Cronbach's Alpha was calculated to assess the internal consistency of the questionnaire. Reliability coefficients above 0.7 were considered acceptable. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity were applied to determine the suitability of the dataset for Exploratory Factor Analysis (EFA). A KMO value above 0.8 and a significant Bartlett's test ($p < 0.05$) indicated adequate sampling adequacy and variable intercorrelation. EFA was performed to extract key components from the dataset. Factors with eigenvalues greater than 1 were retained, and factor loadings above 0.5 were deemed significant for interpretation.

The reliability analysis results are summarized in Table 3.1 below.

Table 3.1 Cronbach's Alpha for Questionnaire Items (n = 175)

Dimension	Number of Items	Cronbach's Alpha (α)
Student Perception of Digital Whiteboards	8	0.871

A Cronbach's Alpha value of 0.871 indicates high internal consistency, suggesting that the items reliably measure the underlying construct of student perception and engagement with digital whiteboard-supported learning. This value exceeds the commonly accepted threshold of 0.70, affirming the internal reliability of the instrument.

2. Qualitative Analysis

Thematic Analysis. Transcripts from the semi-structured interviews were analyzed using NVivo software to identify recurring themes and patterns. This approach provided rich contextual insights into the practical challenges and perceived benefits of integrating digital whiteboards into debate-based teaching.

Expected Output Phase 1

Detailed statistical summaries of students' and instructors' perceptions of digital whiteboard technology, including their views on its usability, effectiveness, and impact on engagement and collaboration. Thematic findings from the interviews, highlighting barriers to and enablers of adopting digital tools in Business Negotiation courses. Key themes may include technical challenges, pedagogical opportunities, and recommendations for effective integration. A validated set of core components derived from the questionnaire and interview data that will inform the development of the digital whiteboard-supported Teaching Debate Model.

By systematically combining quantitative and qualitative findings, this phase establishes a robust foundation for the next stage of model development and testing.

The second phase is to answer research objective 2: to develop and pilot a digital whiteboard-supported debate teaching model.

Digital Whiteboard-Supported Teaching Debate Model

Model Objectives The digital whiteboard-supported Teaching Debate Model is designed to:

1. Enhance student engagement and participation in Business Negotiation courses.
2. Develop critical thinking and argumentation skills through structured debate activities.
3. Facilitate collaboration and teamwork among students using digital tools.
4. Provide a dynamic and interactive learning environment using Digital Whiteboard.
5. Integrate technology seamlessly into traditional teaching methods to bridge theoretical knowledge and practical skills.

Model Framework

1. Preparation Stage

Instructor Preparation:

Design debate topics relevant to Business Negotiation scenarios.

Develop guiding questions and provide reading materials to help students prepare arguments.

Set up the Digital Whiteboard environment, including templates for brainstorming, organizing arguments, and mapping counterarguments.

Student Preparation:

Divide students into debate teams (affirmative and opposing).

Assign roles such as main speaker, rebuttal speaker, and summarizer within each team.

Provide pre-class resources for research and argument development.

2. Implementation Stage

Activity Structure:

1. Opening Statements:

Each team presents their main arguments using digital whiteboard templates to visually represent their ideas.

2. Rebuttal and Counterarguments:

Teams respond to opposing arguments, using the whiteboard to highlight key points and evidence.

3. Collaborative Brainstorming:

Teams use breakout groups to refine their arguments in real time. Digital Whiteboard allows them to share ideas visually and collaboratively.

4. Summation:

Each team presents a final summary, integrating points from their earlier presentations and rebuttals.

Facilitation Role:

The instructor acts as a moderator, guiding the debate flow and ensuring adherence to time limits. The instructor also provides prompts or challenges to stimulate deeper discussion.

3. Post-Debate Reflection Stage

Self-Assessment and Peer Feedback:

Students complete a reflection activity using a digital form, evaluating their performance and their team's effectiveness.

Teams review the digital whiteboard content to identify strengths and areas for improvement.

Instructor Feedback:

The instructor reviews whiteboard artifacts and provides targeted feedback on argumentation quality, teamwork, and use of evidence.

Key Features of the Model

1. Dynamic Visualization

Digital Whiteboard enables real-time visualization of ideas, fostering clearer communication and better argument organization.

2. Collaboration Tools

Students can collaboratively annotate, edit, and organize content, promoting teamwork and shared ownership of ideas.

3. Integrated Assessment

The model includes formative assessment tools, such as peer reviews and instructor feedback, to support ongoing learning.

4. Scalability:

The model can be adapted to different class sizes and instructional contexts, making it flexible for various educational environments.

Expected Outcomes

1. Improved student engagement and participation in debates.
2. Enhanced critical thinking, argumentation, and negotiation skills.
3. Greater familiarity with digital tools and their applications in professional settings.
4. A structured and interactive learning experience that bridges theory and practice.

This model serves as the foundation for Phase 2 and will be iteratively refined based on expert feedback and pilot testing.

Research steps

1. To review in detail the findings from Phase 1 and identify the key components required for the digital whiteboard-supported Teaching Debate Model in Business Negotiation courses.
2. To define the instructional objectives of the digital whiteboard-supported Teaching Debate Model, focusing on student engagement, argument structuring, negotiation skill development, and effective integration of digital tools.
3. To develop an initial framework for the teaching model, including its main phases (such as preparation, structuring, debate, and reflection) and core components (activities, roles, digital whiteboard functions, and expected learning outcomes).

4. To present the initial framework, along with the draft observation checklist, student feedback questionnaire, and instructor interview protocol, to ten educational experts for systematic review and content validation using the Index of Item–Objective Congruence (IOC).

5. To analyze expert feedback and IOC scores for each component and item, revising or removing elements that score below the IOC threshold of 0.50, and refining the framework and instruments until satisfactory agreement and content validity are achieved.

6. To design a prototype of the teaching model with detailed lesson plans and activity guidelines, clearly specifying how the digital whiteboard will be used in each phase of the debate, and aligning all activities with the validated framework.

7. To pilot the teaching model in a Business Negotiation class with 25 students over four weeks, applying the prototype model in real classroom conditions.

8. To collect data during the pilot phase through classroom observations (using the validated observation checklist), student feedback questionnaires, and semi-structured instructor interviews, ensuring that all instruments used have passed IOC validation.

9. To analyze the pilot data to identify strengths, weaknesses, and practical challenges of the teaching model, including issues related to time management, technical constraints, and students' readiness for digital debate activities.

10. To refine and finalize the teaching model based on the pilot findings, addressing identified challenges and preparing the model for broader implementation and evaluation in Phase 3.

Research Instruments

The instruments used in Phase 2 were divided into two categories as follows:

1. Instrument used in the pilot implementation

1.1 The draft digital whiteboard-supported debate teaching model, including lesson plans and activity guidelines

2. Instruments used for data collection

- 2.1 Student feedback questionnaire
- 2.2 Classroom observation checklist
- 2.3 Instructor interview protocol
- 2.4 Pre-test and post-test papers
- 2.5 Digital whiteboard usage log form

Designing instrument

The design of the research instruments for Phase 2 followed a structured, iterative, and validation-driven process to ensure that each instrument was closely aligned with the study's objectives and capable of capturing the necessary data for refining the digital whiteboard-supported Teaching Debate Model. The development process integrated both theoretical grounding and expert validation using the Index of Item–Objective Congruence (IOC), ensuring methodological rigor and practical relevance.

Teaching Model Framework

The digital whiteboard-supported Teaching Debate Model was initially designed based on insights obtained from Phase 1, including students' needs, expectations, and perceived challenges. The framework consisted of lesson plan templates, debate activity structures, pre-class preparation guidelines, digital whiteboard usage procedures, and instructor facilitation strategies tailored specifically for Business Negotiation courses. The framework emphasized interactive learning, collaborative reasoning, structured argumentation, and the integration of visual tools to support debate processes.

To ensure that the framework content was valid and matched the intended instructional objectives, the initial draft underwent expert evaluation using the Index of Item–Objective Congruence (IOC). Ten experts reviewed all components of the framework. The experts selected for this evaluation were required to meet the following criteria: (1) holding a doctoral degree or serving at the rank of assistant professor or above; (2) having a minimum of ten years of experience in educational technology, instructional design, or Business Negotiation pedagogy; (3) having

demonstrated expertise relevant to digital whiteboard-supported instruction or debate-based teaching models; and (4) being currently active in teaching, research, or professional practice in a related field. Experts rated each element using the IOC scale: +1 indicating clear relevance, 0 indicating uncertainty, and -1 indicating irrelevance. Elements with IOC values of 0.50 or higher were retained, while those below the threshold were revised or removed. Revisions included refining debate procedure sequences, clarifying whiteboard interaction protocols, and adding instructor moderation tools that experts highlighted as necessary for managing real-time student participation.

After incorporating expert feedback, multiple drafts of the framework were reviewed again by the research advisor to ensure coherence and instructional feasibility. The revised model was finalized for pilot implementation in Phase 2.

Observation Checklist

The classroom observation checklist was designed to systematically capture the real-time dynamics of the pilot teaching sessions. Key indicators included: level of student engagement, quality of argument structuring, collaboration within and across debate teams, time management, clarity of instructions, and the functionality and pedagogical utility of the digital whiteboard.

The first draft of the checklist was subjected to IOC evaluation by the same panel of ten experts. Each item—such as indicators of student interaction, quality of rebuttals, and frequency of whiteboard-based contributions—was rated using the IOC scale. Items achieving $\text{IOC} \geq 0.50$ were kept, while items with lower IOC values were revised for clarity or replaced with more representative indicators. Expert suggestions included adding behavioral markers for student initiative, the instructor's facilitation of digital tools, and the clarity of visual argument mapping.

Following expert validation, the checklist was tested in a mock classroom environment to ensure practicality and ease of use. Observers provided feedback regarding item specificity, timing considerations, and alignment with lesson flow. Adjustments were made before finalizing the instrument for use in the pilot implementation.

Student Feedback Questionnaire

The student feedback questionnaire was developed to evaluate students' perceptions of the teaching model after the pilot implementation. The questionnaire consisted of three sections:

1. Demographic Information – including academic year, prior debate experience, and familiarity with digital tools.
2. Perceptions of the Teaching Model – measured through a 5-point Likert scale assessing clarity of instruction, engagement level, collaboration effectiveness, and usefulness of the digital whiteboard in structuring arguments.
3. Learning Outcomes and Usability – including Likert items on critical thinking, teamwork, and adaptability of digital tools, along with open-ended questions for qualitative insights.

To ensure content validity, the questionnaire underwent IOC review by ten experts. Each item was rated using the +1/0/-1 scale. Items with IOC values ≥ 0.50 were accepted; items falling below the threshold were revised to improve clarity, reduce ambiguity, or enhance alignment with the teaching model's core constructs. This included rephrasing items related to engagement, adding items capturing cognitive load during digital tasks, and clarifying wording for items targeting debate performance.

After incorporating expert revisions, the questionnaire was piloted with a small group of students. Their feedback helped identify minor ambiguities, redundant wording, and response-pattern issues. Reliability testing using Cronbach's Alpha was conducted, and all major constructs met the acceptable reliability threshold of 0.70.

Instructor Interview Protocol

A semi-structured interview protocol was developed to guide post-pilot reflections with the instructor. The protocol included questions related to:

- practical implementation of the teaching model,
- ease of integrating digital whiteboard features,
- observed challenges during debates,
- time management issues,

- student participation patterns,
- and recommendations for model improvement.

The interview protocol was also reviewed via IOC by ten experts with experience in qualitative research, instructional design, and negotiation education. Using the +1/0/-1 scale, experts rated the degree to which each question aligned with the study objectives. Questions not meeting the IOC threshold were revised to sharpen focus, reduce redundancy, or enhance depth. This resulted in the addition of probes regarding instructor workload in digital moderation and the cognitive readiness of students for technology-supported debates.

Final adjustments ensured that the interview guide allowed for flexibility while still providing comprehensive coverage of the instructional processes necessary to refine the teaching model.

Digital Whiteboard Usage Logs

Digital whiteboard usage logs were designed to capture objective data such as frequency of tool activation, types of functions used, number of student contributions, duration of interactive segments, and the sequence of argument mapping activities. These logs served as non-intrusive records of student engagement and were triangulated with questionnaire responses and observation data.

Because usage logs function as system-generated behavioral data, they were not subjected to IOC evaluation; however, the indicators included in the log template were reviewed by the advisor to ensure alignment with the instructional design and research goals. A mock data analysis was conducted to confirm interpretability and provide the foundation for the pilot usage patterns studied in Phase 2.

All Phase 2 instruments—including the observation checklist, student feedback questionnaire, and instructor interview protocol—were validated through IOC analysis prior to use (Appendix IOC-3 and Appendix IOC-4).

To ensure rigorous data analysis, this study employed statistical software to process and interpret both quantitative and qualitative data collected during the pilot implementation of the digital whiteboard-supported Teaching Debate Model.

Cronbach's Alpha was computed to assess the internal consistency of the questionnaire items. A reliability coefficient above 0.7 was considered acceptable.

The Kaiser-Meyer-Olkin (KMO) Measure was used to evaluate sampling adequacy for factor analysis. A KMO value above 0.8 was considered excellent. Bartlett's Test of Sphericity was conducted to determine if the correlation matrix was suitable for factor analysis. A significant p-value (<0.05) indicated sufficient correlations among variables. Exploratory Factor Analysis (EFA) was performed to identify key constructs in student responses. Factors with eigenvalues greater than 1 were retained, and factor loadings above 0.5 were deemed significant for interpretation. Where necessary, independent sample t-tests or ANOVA were used to compare responses across different student groups (e.g., by academic year or prior experience with digital tools).

2. Qualitative Data Analysis - NVivo

Thematic Analysis: NVivo software was employed to analyze transcribed interview data and student feedback. Thematic coding was applied to identify recurring themes, such as challenges, benefits, and suggested improvements in implementing digital whiteboards for debate teaching.

Word Frequency Analysis: NVivo's word cloud and frequency analysis features were used to detect key terms and concepts frequently mentioned by participants, providing deeper insights into user perceptions.

Cross-Case Analysis: Responses from different interviewees (students vs. instructors) were compared to identify patterns and differences in perspectives.

3. Digital Whiteboard Usage Analysis

Usage logs from Digital Whiteboard were collected and analyzed to track student interactions. Key indicators included:

Frequency of tool usage.

Types of features utilized (e.g., annotation, collaboration tools, mind mapping).

Number of revisions made to debate argument structures.

This data was processed using Digital Excel and visualized through charts to illustrate usage trends.

Data Collection

1. Pilot Study Implementation

The digital whiteboard-supported Teaching Debate Model was implemented in a Business Negotiation class with 25 students at Siam University. The pilot phase lasted for four weeks, during which structured debate sessions were conducted using the digital whiteboard. Students participated in debates following the model's framework, which included preparation, argument development, rebuttal, and reflection stages.

2. Methods of Data Collection

Before any data were collected, all Phase 2 instruments—including the teaching model framework, observation checklist, student feedback questionnaire, and instructor interview protocol—had undergone content validation by ten experts using the Index of Item–Objective Congruence (IOC). The full IOC evaluation tables for these Phase 2 instruments are provided in Appendix IOC-3 and Appendix IOC-4. Items scoring below 0.50 were revised or replaced to ensure clarity, relevance, and alignment with the model components.

The IOC value for each item was calculated using the formula presented in Chapter 2 (Equation 1). Items with IOC values of 0.50 or higher were retained; items below 0.50 were revised or removed.

Survey Questionnaire:

Distributed through Google Forms to all participating students at the end of the pilot phase to gather feedback on engagement, usability, clarity of debate procedures, and perceived learning benefits.

Only the IOC-validated questionnaire items were included in the version administered to students.

Classroom Observations:

The instructor documented observations on student participation, collaboration levels, debate quality, and digital tool effectiveness during each session using the IOC-validated observation checklist.

Instructor Interview:

A semi-structured interview was conducted with the instructor to assess the model's feasibility, challenges, and areas for improvement.

The interview questions were validated through IOC to ensure that each prompt captured relevant aspects of instructional experience and model implementation.

Digital Whiteboard Usage Logs:

Interaction logs from the platform were collected to track student engagement, participation frequency, and collaboration patterns.

Data Analysis

Prior to conducting quantitative and qualitative analyses in Phase 2, all instruments—including the teaching model framework, observation checklist, student feedback questionnaire, and instructor interview protocol—were validated through the Index of Item–Objective Congruence (IOC). Only items and components with IOC scores of 0.50 or higher were retained, ensuring strong content validity before applying statistical and thematic analysis.

1. Quantitative Data Analysis

Descriptive Statistics (mean, standard deviation, frequencies) were used to summarize student feedback from the questionnaire, providing an overview of engagement levels, perceived ease of use, and effectiveness of the digital whiteboard-supported debate model.

Reliability Testing (Cronbach's Alpha) was performed to ensure internal consistency of all questionnaire items, with results confirmed to exceed the acceptable threshold of 0.70.

Factor Analysis (Exploratory Factor Analysis, EFA) was applied to identify key dimensions influencing students' perceptions of the teaching model. The Kaiser-Meyer-Olkin (KMO) measure was used to assess sampling adequacy, while Bartlett's Test of Sphericity ensured factorability of the dataset. Factors with eigenvalues greater than 1 were retained.

Comparative Analysis (ANOVA and t-tests) was conducted:

Independent samples t-test: Used to compare engagement levels between students with prior experience using digital tools and those without.

The formulas for the independent samples t-test and the paired samples t-test are presented in Chapter 2 (Equations 5 and 6).

Paired samples t-test: Compared pre-test and post-test scores of students in the pilot group to assess learning improvement after exposure to the teaching model.

One-Way ANOVA: Used to examine variations in students' perceptions based on their academic backgrounds (first-year to fourth-year students).

2. Qualitative Data Analysis

Thematic Analysis was used to process interview transcripts and open-ended questionnaire responses. NVivo software facilitated coding and categorization of responses into key themes.

Classroom Observation Analysis: Instructor-led observations were analyzed to assess real-time engagement, student participation patterns, and the overall effectiveness of the digital whiteboard-supported debate structure.

Digital Whiteboard Interaction Logs: Usage data, including frequency of student contributions, annotation activity, and collaborative engagement, were examined to identify interaction trends over the pilot period.

Instructor Feedback Review: Qualitative responses from instructors involved in the pilot phase were coded to extract insights regarding usability, classroom management benefits, and areas for improvement in the teaching model.

Expected Output Phase 2

1. Effectiveness of the Teaching Model
2. Identification of Key Success Factors
3. Challenges and Areas for Improvement
4. Refined Teaching Model

The third phase is to answer research objective 3: to evaluate the effectiveness of the model through an experimental and control group comparison.

Research steps

1. To finalize the revised digital whiteboard-supported Teaching Debate Model based on the empirical findings and expert feedback obtained in Phase 2.
2. To select a larger sample group of Business Negotiation students for broader implementation, including 100 students divided into an experimental group (using the model) and a control group (receiving traditional instruction).
3. To design the evaluation instruments for Phase 3, including the pre-test and post-test, the scoring rubric, the student feedback questionnaire, and the instructor reflection interview guide, all aligned with the learning objectives and components of the teaching model.
4. To submit these evaluation instruments to ten experts in Business Negotiation education and educational research for content validation using the Index of Item–Objective Congruence (IOC), and to revise items or criteria that receive IOC values below 0.50 until acceptable content validity is achieved.
5. To provide training for instructors on how to implement the teaching model effectively, including guidance on managing debates, using the digital whiteboard functions, and applying the validated evaluation tools consistently across experimental and control groups.
6. To implement the teaching model over an eight-week period in multiple class sessions with the experimental group, while the control group receives conventional debate-based or lecture-based instruction without structured digital whiteboard integration.

7. To observe classroom interactions and monitor students' use of the digital whiteboard in the experimental group, using structured observation records to document engagement, interaction patterns, and use of visual argument mapping.

8. To collect quantitative data through pre-test and post-test assessments, scored with the validated rubric, in both the experimental and control groups, in order to measure changes in students' negotiation knowledge and debate performance.

9. To distribute feedback questionnaires to students and instructors to evaluate the usability, clarity, and perceived effectiveness of the teaching model and the digital whiteboard-supported activities.

10. To conduct semi-structured interviews with instructors for qualitative insights into the practicality, benefits, and limitations of the teaching model in real classroom environments.

11. To compare findings across different student groups and between the experimental and control groups, integrating quantitative results and qualitative evidence to evaluate the overall effectiveness of the teaching model.

12. To synthesize all collected data and extract key conclusions about the teaching model's impact, usability, and scalability, and to formulate recommendations for refining the model for long-term application and for future research.

Research Instruments

1. Pre-test and Post-test
2. Student Feedback Questionnaire
3. Instructor Reflection Interview Guide
4. Digital Whiteboard Usage and Classroom Records

Designing instrument

The research instruments used in Phase 3 were designed to evaluate the effectiveness of the finalized digital whiteboard-supported Teaching Debate Model in a real classroom setting, through a comparison between an experimental group and a control group. The instruments included a pre-test and post-test, a student

feedback questionnaire, an instructor reflection interview guide, and records of digital whiteboard usage. Their development followed a rigorous process to ensure content validity, reliability, and close alignment with the research objectives. The Index of Item–Objective Congruence (IOC) was used as a central procedure for validating the content of the instruments before formal implementation.

Pre-test and Post-test

The pre-test and post-test were designed as parallel instruments to measure students' knowledge and skills in Business Negotiation and debate performance before and after the implementation of the teaching model. Each test consisted of 15 items, organized into three sections:

- multiple-choice questions assessing key negotiation concepts (e.g., BATNA, anchoring, integrative vs. distributive negotiation),

- short-answer questions evaluating the ability to explain and apply negotiation strategies, and

- case-based questions requiring students to analyze a negotiation scenario, construct arguments and rebuttals, and demonstrate structured reasoning.

The same test paper and scoring rubric were used for both the experimental and control groups, in both the pre-test and post-test phases, to ensure consistency and comparability. A detailed scoring rubric was developed to guide the evaluation of short-answer and case-based responses, including criteria for accuracy of concepts, logical coherence, use of negotiation terminology, and depth of analysis.

To establish content validity, the test items and rubric were evaluated by ten experts. The experts selected for this evaluation were required to meet the following criteria: (1) holding a doctoral degree or serving at the rank of assistant professor or above; (2) having a minimum of ten years of experience in Business Negotiation teaching, curriculum design, or educational assessment; (3) having demonstrated expertise relevant to the content area under evaluation; and (4) being currently active in teaching, research, or professional practice in a related field. The Index of Item–Objective Congruence (IOC) was applied, where +1 indicated clear congruence with the test objective, 0 indicated uncertainty, and –1 indicated non-congruence.

Items with IOC values of 0.50 or higher were retained. Items with IOC below 0.50 were revised in wording, clarified in scope, or removed if judged redundant or weakly aligned with the construct. Experts also reviewed the balance of cognitive levels across items (recall, application, analysis), ensuring that the test reflected both foundational knowledge and higher-order thinking in negotiation.

The scoring rubric itself was likewise reviewed using IOC principles, focusing on the alignment between each criterion and the intended learning outcomes of the course. Revisions were made to descriptors where experts suggested more explicit wording, clearer differentiation between performance levels, or closer linkage to negotiation competencies. The finalized test and rubric were then approved by the major advisor for use in Phase 3.

Student Feedback Questionnaire

The Phase 3 student feedback questionnaire was constructed to evaluate students' experiences with the teaching model after the four-week intervention. It was administered to both the experimental and control groups, with parallel wording to allow direct comparison. The questionnaire contained sections on:

1. perceived engagement during the course,
2. clarity and organization of debate activities,
3. perceived improvement in negotiation and argumentation skills,
4. satisfaction with the overall learning experience, and
5. open-ended questions for qualitative comments.

Items in the Likert-scale sections were designed as 5-point statements (1 = Strongly Disagree to 5 = Strongly Agree), focusing on aspects such as participation opportunities, confidence in speaking during debates, understanding of negotiation concepts, and, for the experimental group, perceptions of the digital whiteboard's support for structuring arguments and tracking rebuttals.

As with other instruments, the questionnaire was submitted to the same panel of ten experts for IOC evaluation. Each item was rated on the +1 / 0 / -1 scale according to its relevance to the objectives of Phase 3, which aimed to assess students' perceived learning outcomes and experiences under different teaching

conditions. Items with IOC values ≥ 0.50 were accepted. Items with lower IOC values were revised to sharpen their focus, avoid overlapping content, and improve clarity for undergraduate respondents. In particular, items related to classroom engagement and clarity of debate procedures were refined based on expert comments to better differentiate between the effects of the teaching method itself and students' prior familiarity with debate.

After expert validation, the questionnaire was reviewed by the advisor and minor adjustments were made to item ordering and section layout to improve response flow. The instrument was then ready to be administered at the end of the intervention period for both groups.

Instructor Reflection Interview Guide

To gain deeper insight into the implementation of the teaching model and to interpret quantitative results, a semi-structured instructor reflection interview guide was developed for Phase 3. The instructor, who taught both the experimental and control classes, was invited to reflect on:

1. differences in classroom dynamics between the two groups,
2. perceived impact of the digital whiteboard-supported model on student participation and argument structuring,
3. challenges encountered in balancing time, content coverage, and digital tool use,
4. observations of students' negotiation performance and confidence, and
5. recommendations for scaling or adapting the model to other cohorts.

The interview guide was evaluated using the IOC procedure by ten experts in educational research, qualitative methods, or business education. Experts rated each question on its alignment with the objective of evaluating the teaching model's effectiveness and practicality. Questions that did not reach the IOC threshold of 0.50 were revised, merged, or in some cases split into more focused prompts. This process ensured that the interview would systematically cover all important aspects of model implementation while still allowing the instructor to elaborate freely where necessary.

The final version of the interview guide thus provided a structured yet flexible tool to collect rich qualitative data, which complemented the test results and student feedback in the analysis of model effectiveness.

Digital Whiteboard Usage and Classroom Records

For the experimental group, usage data from the digital whiteboard were collected to document how the tool was employed during debates. These records included:

1. number of whiteboard sessions per class,
2. frequency of student contributions,
3. types of visual structures used (e.g., argument maps, rebuttal lists, role assignments), and
4. the sequence of activities supported by the whiteboard (brainstorming, structuring, live debate, reflection).

While the digital log template was not subjected to IOC evaluation in the same way as the questionnaire or test, its design was carefully reviewed by the advisor to ensure that the indicators matched the theoretical structure of the teaching model and the constructs analyzed in the results chapter. These data served as an objective reference to support the interpretation of behavioral patterns, especially when triangulated with test scores, student feedback, and instructor reflections.

All Phase 3 evaluation instruments—including the pre-/post-test, scoring rubric, student feedback questionnaire, and instructor interview guide—were validated using IOC prior to implementation (Appendix IOC-5, Appendix IOC-6, and Appendix IOC-7).

Data Collection

Before beginning data collection in Phase 3, all evaluation instruments—including the pre-test, post-test, scoring rubric, student feedback questionnaire, and instructor reflection interview guide—were subjected to IOC validation by ten experts in Business Negotiation education and instructional design. Corresponding IOC result tables for Phase 3 instruments are included in Appendix IOC-5, Appendix IOC-6, and

Appendix IOC-7. Items or scoring criteria that scored below 0.50 were refined to ensure content validity and alignment with the model's learning outcomes.

1. Student Feedback Questionnaire

The validated questionnaire was distributed to both the experimental group and the control group to capture students' perceptions of learning effectiveness, debate clarity, instructional structure, and—in the case of the experimental group—the usefulness of digital whiteboard integration.

2. Instructor Interviews

Semi-structured interviews were conducted with the instructor responsible for both groups. The validated interview guide ensured that the questions addressed pedagogical practicality, classroom challenges, and comparative insights between the two instructional conditions.

3. Classroom Observations

Structured observations were conducted across both groups to document behavioral differences in engagement, argument quality, and participation patterns. The observation form used in this phase had been adapted from Phase 2 and re-validated to ensure its suitability for a controlled comparison.

4. Digital Whiteboard Usage Logs

For the experimental group, digital whiteboard logs were collected to provide objective evidence of student participation, argument structure development, and collaboration frequency. These logs complemented test results and questionnaire data by offering real-time behavioral indicators.

Data Analysis

Before analyzing Phase 3 data, all evaluation instruments—including the pre-test, post-test, scoring rubric, student feedback questionnaire, and instructor reflection interview guide—were validated for content accuracy using the Index of Item–Objective Congruence (IOC). Only items and rubric criteria with IOC values of 0.50 or above were utilized in the final analysis to ensure consistency and validity across both quantitative and qualitative datasets.

Quantitative Data Analysis

Means, standard deviations, and frequencies were calculated to summarize questionnaire responses. Cronbach's Alpha was used to assess the internal consistency of survey instruments (target > 0.7). KMO and Bartlett's test were conducted to validate factor analysis suitability.

Paired t-tests were conducted to compare pre-test and post-test scores and evaluate learning improvements. ANOVA was used to examine variations in outcomes across different student groups.

Qualitative Data Analysis

NVivo was used to code and categorize recurring themes from instructor interviews and open-ended student feedback. Data from different sources (e.g., student questionnaires vs. instructor interviews) were compared to identify consistent patterns and discrepancies. Student participation frequency and content revisions were analyzed to assess engagement and collaborative learning outcomes.

Expected Output Phase 3

Evidence-based assessment of whether the digital whiteboard-supported debate model enhances students' debate and negotiation skills.

Summary

This chapter outlined the research methodology used to develop, implement, and evaluate the digital whiteboard-supported Teaching Debate Model for Business Negotiation courses. The study was structured into three phases: (1) assessing needs and potential, (2) developing the model, and (3) evaluating its effectiveness.

In Phase 1, data was collected through surveys and interviews to identify key components necessary for integrating digital whiteboards into debate-based learning. In Phase 2, a structured teaching model was designed and piloted with a selected sample, incorporating expert feedback and iterative refinements. Phase 3 involved a broader implementation of the model, utilizing pre-test and post-test assessments, feedback questionnaires, classroom observations, and instructor interviews to evaluate its impact.

Both quantitative and qualitative data analysis techniques were employed to measure student engagement, learning outcomes, and overall usability of the model. The findings from this chapter lay the foundation for the subsequent discussion of results and recommendations in the following chapters.

Chapter 4

Result of Analysis

This research was to study the development and evaluation of a digital whiteboard-supported Teaching Debate Model for undergraduate students in Business Negotiation courses at Siam University. The objectives of this research were as follows: 1) to identify the needs and components of digital whiteboard integration in Business Negotiation teaching, 2) to develop and pilot a digital whiteboard-supported Teaching Debate Model, and 3) to evaluate the effectiveness of the model through an experimental and control group comparison. This chapter presents and analyzes the research results in detail. The data analysis results can be presented as follows:

1. Symbols and abbreviations
2. Presentation of data collection and analysis
3. Results of data analysis according to research objectives

The details are as follows.

Abbreviations and Analytical Tools

This chapter presents the findings of the study according to the three main research objectives outlined in Chapter 1. Each objective is addressed through an analysis of data collected during the respective research phases. A combination of quantitative and qualitative analysis techniques was applied, consistent with the study's mixed-methods approach.

Before presenting the analysis results, the following abbreviations and analytical tools are defined for reference:

Abbreviations Used in This Chapter:

M = Mean

SD = Standard Deviation

α = Cronbach's Alpha (internal consistency coefficient)

EFA = Exploratory Factor Analysis

KMO = Kaiser-Meyer-Olkin Measure of Sampling Adequacy

t-test = Student's t-test (used for comparing means)

ANOVA = Analysis of Variance

n = Number of respondents

NVivo = Software used for qualitative data analysis

Quantitative Analytical Tools:

Descriptive Statistics were used to summarize the participants' responses, including frequency, percentage, mean, and standard deviation.

Reliability Analysis (Cronbach's Alpha) was applied to test the internal consistency of the research instruments.

Exploratory Factor Analysis (EFA) was conducted to extract underlying constructs related to students' perceptions and engagement.

Inferential Statistics, including t-tests and ANOVA, were used to compare pre-test and post-test results and analyze group differences.

Qualitative Analytical Tools:

Thematic Analysis was applied to open-ended responses and interview transcripts to identify key themes and patterns.

NVivo software was used for coding, categorizing, and analyzing qualitative data.

Classroom Observation and Digital Whiteboard Logs were interpreted to assess interaction levels and behavioral patterns.

These tools and abbreviations serve as a foundation for the results interpretation in the following sections, which are organized based on each research objective.

Before proceeding to the presentation of the data analysis results, it is important to note that all research instruments used across the three phases of this study underwent rigorous content validation to ensure validity and alignment with the research objectives. The questionnaire items, observation checklist, interview protocols, and pre-/post-test instruments were reviewed by a panel of ten experts in educational technology and Business Negotiation pedagogy using the Index of Item–

Objective Congruence (IOC). Only items scoring 0.50 or above were retained, while lower-scoring items were revised or replaced. This validation process ensured that the instruments were conceptually sound and methodologically appropriate before entering formal data analysis.

Following IOC validation, the study employed a mixed-methods analytical strategy consistent with the multi-phase research design. Quantitative analyses—including descriptive statistics, reliability testing, factor analysis, and inferential comparisons—were used to identify patterns, validate constructs, and evaluate learning outcomes. Qualitative analyses—including thematic coding, classroom observation review, and analysis of digital whiteboard interaction logs—were used to provide contextual depth and triangulate the quantitative findings.

The integration of validated instruments with complementary analytical approaches strengthened the robustness of the findings and ensured that each research objective was addressed from multiple methodological perspectives.

Overview of Data Collection and Analysis

Data collection and analysis in this study were structured according to the three research phases corresponding to the study's objectives. Each phase utilized distinct data sources and analytical approaches to ensure that both quantitative and qualitative insights were adequately captured and triangulated.

In Phase 1, data were collected through a structured questionnaire distributed to 175 undergraduate students from all four academic years and through interviews with five Business Negotiation instructors. The student questionnaire responses were analyzed using descriptive statistics and exploratory factor analysis, while qualitative insights from instructor interviews were examined using thematic analysis. This phase aimed to assess the current needs and potential for implementing digital whiteboards in debate-based teaching.

Phase 2 involved the development and pilot implementation of the digital whiteboard-supported Teaching Debate Model. Data were collected from 25 students through feedback questionnaires, pre-test and post-test assessments, classroom observations, and one instructor interview. Quantitative data were analyzed using

descriptive statistics, reliability testing (Cronbach's Alpha), and comparative tests such as paired sample t-tests and one-way ANOVA. Qualitative data, including interview transcripts and classroom observations, were analyzed thematically using NVivo software to refine the teaching model.

In Phase 3, the full implementation of the finalized teaching model was conducted with 100 students, divided evenly into an experimental group and a control group. Pre-test and post-test assessments were administered to both groups, along with post-intervention feedback surveys and instructor interviews. The quantitative data were analyzed using paired sample t-tests and independent sample t-tests to evaluate the effectiveness of the model, while qualitative feedback and digital whiteboard usage logs were thematically analyzed to provide further context to the quantitative findings.

Through this structured and phased approach to data collection and analysis, the study ensured comprehensive coverage of the research objectives and maximized the validity of the findings.

Findings Related to Objective 1 – To Identify the Needs and Components of Digital Whiteboard Integration in Business Negotiation Teaching

Descriptive Statistics of Student Questionnaire Responses

Before presenting the analysis of students' perceptions toward digital whiteboard integration, it is necessary to outline the basic demographic profile of the sample group. A total of 175 undergraduate students participated in this phase of the study. Participants were selected using stratified sampling from the four academic years of the Business Negotiation program at Siam University.

The distribution of the sample by academic year and gender is presented in the following tables:

Table 4.1 Demographic Characteristics of Participants (Phase 1, n = 175)

Academic Year	Frequency (n)	Percentage (%)
First Year	45	25.7%
Second Year	42	24.0%
Third Year	45	25.7%
Fourth Year	43	24.6%
Total	175	100%
Male	81	46.3%
Female	94	53.7%
Total	175	100%

As shown in Table 4.1, the sample is well balanced across the four academic years, with each group contributing approximately one-fourth of the total responses. This proportional distribution ensures that feedback reflects a wide range of student perspectives and levels of academic experience. And Table 4.1 shows that 94 of the participants (53.7%) identified as female, while 81 (46.3%) identified as male. This gender balance contributes to the reliability of the analysis and helps avoid bias in interpreting perceptions toward digital whiteboard-supported learning environments.

To assess the needs and potential for digital whiteboard integration in Business Negotiation courses, a structured questionnaire was administered to 175 undergraduate students at Siam University. These students were proportionally selected from all four academic years through stratified sampling to ensure representativeness.

The questionnaire included items covering students' familiarity with digital tools, frequency of digital whiteboard exposure, preferences for interactive learning methods, and perceived value of digital platforms in debate-based education. Each item was measured on a five-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree").

The table below presents a summary of the descriptive statistics for selected items from the questionnaire:

Table 4.2 Summary of the descriptive statistics

Item	M	SD
I have prior experience using digital whiteboard tools in classroom activities.	2.81	1.02
I feel confident using digital platforms to participate in academic discussions.	3.42	0.95
I prefer learning through interactive and visually supported methods.	4.18	0.76
I believe digital whiteboards can make debate activities more engaging.	4.25	0.81
I am open to using digital whiteboards in future Business Negotiation courses.	4.31	0.79
I think digital whiteboards can help structure arguments during debates.	4.15	0.74
I find it difficult to express my ideas in traditional lecture-based formats.	3.69	0.88
I am more likely to contribute when learning tools are interactive and collaborative.	4.22	0.82

As shown in the table 4.3, students generally reported positive attitudes toward the use of digital whiteboards in debate-based teaching. The highest mean score ($M = 4.31$, $SD = 0.79$) was found in students' openness to using digital whiteboards in future courses, indicating a strong level of acceptance. Similarly, items related to engagement ($M = 4.25$) and preference for interactive learning ($M = 4.18$) received high scores, highlighting students' inclination toward dynamic and collaborative learning environments.

The lowest score was reported in students' prior experience using digital whiteboards ($M = 2.81$), suggesting that while interest and perceived potential are high, actual exposure remains limited. This finding reinforces the relevance of exploring a new instructional model that introduces digital whiteboards into the Business Negotiation classroom.

Reliability and Validity Testing

To ensure the quality and internal consistency of the student questionnaire used in Phase 1, both reliability analysis and validity testing were conducted. These tests aimed to confirm that the instrument was suitable for measuring student perceptions of digital whiteboard usage in debate-based Business Negotiation courses.

1. Reliability Testing – Cronbach's Alpha

Cronbach's Alpha (α) was calculated to evaluate the internal consistency of the questionnaire items. The questionnaire consisted of eight core items, each designed to measure students' attitudes toward digital whiteboard usage, engagement preferences, and instructional potential.

2. Validity Testing – KMO and Bartlett's Test of Sphericity

To evaluate the construct validity and the suitability of the dataset for Exploratory Factor Analysis (EFA), the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity were conducted.

Table 4.3 KMO and Bartlett's Test Results

Test	Value
KMO Measure of Sampling Adequacy	0.826
Bartlett's Test Approx. Chi-Square	531.72
df	28

The KMO value of 0.826 falls within the "meritorious" range (0.80–0.89), indicating that the sample was adequate for conducting factor analysis. Furthermore,

Bartlett's Test of Sphericity produced a statistically significant result ($p < 0.001$), confirming that there are sufficient inter-item correlations to justify factor extraction.

These results demonstrate that the questionnaire used in Phase 1 was both reliable and valid, ensuring the robustness of the subsequent analysis of student needs and perceptions regarding digital whiteboard integration.

Exploratory Factor Analysis (EFA)

An Exploratory Factor Analysis (EFA) was conducted to identify the underlying dimensions representing students' perceptions and expectations of digital whiteboard-supported debate learning. This analysis helped to clarify the key components that inform the instructional model development in Phase 2.

Based on the results of the KMO and Bartlett's tests, the dataset was deemed suitable for factor extraction. The EFA was conducted using Principal Component Analysis with Varimax Rotation, and only factors with eigenvalues greater than 1.0 were retained.

Table 4.4 Total Variance Explained

Component	Eigenvalue	% of Variance	Cumulative %
1	3.124	39.05%	39.05%
2	1.217	15.21%	54.26%

As shown in Table 4.4, two components were extracted from the factor analysis. Component 1, labelled Engagement and Interaction, captures items related to students' perceived value of real-time collaborative features, visual participation modes, and the interactive affordances of digital whiteboards in supporting debate activities. It accounted for the larger share of explained variance, reflecting the centrality of engagement in students' overall perceptions. Component 2, labelled Argument Structuring Support, captures items related to students' views on how digital tools help them organise, map, and present debate arguments more clearly and systematically. Together, these two components explain a cumulative 54.26% of

the total variance, which is acceptable in social sciences research and confirms that both dimensions are meaningful and distinct aspects of students' needs for digital whiteboard integration in Business Negotiation teaching.

cumulative 54.26% of the total variance, which is acceptable in social sciences research. These two factors represent major underlying themes in students' perceptions of digital whiteboard usage.

Table 4.5 Rotated Component Matrix

Questionnaire Item	Component 1	Component 2
I prefer learning through interactive and visually supported methods.	0.782	
I believe digital whiteboards can make debate activities more engaging.	0.752	
I am open to using digital whiteboards in future Business Negotiation courses.	0.748	
I think digital whiteboards can help structure arguments during debates.	0.691	
I am more likely to contribute when tools are interactive and collaborative.	0.656	
I find it difficult to express ideas in traditional lecture-based formats.		0.811
I feel confident using digital platforms to participate in academic discussions.		0.708
I have prior experience using digital whiteboard tools in classroom activities.		0.643

Component 1 was interpreted as “Perceived Engagement and Instructional Potential”, reflecting students’ enthusiasm and willingness to use digital whiteboards in an interactive learning environment.

Component 2 was interpreted as “Digital Confidence and Readiness”, capturing students’ familiarity, comfort, and prior exposure to digital tools in classroom contexts.

These two components provided a foundation for the design of the teaching model in Phase 2, by aligning instructional strategies with students’ preferred modes of engagement and technological readiness levels.

Thematic Analysis of Instructor Interview Responses

To complement the quantitative findings gathered from students, semi-structured interviews were conducted with five instructors who taught Business Negotiation courses at Siam University. The objective was to gain insight into their perspectives on the use of digital whiteboards in debate-based instruction, as well as their perceptions of classroom challenges, opportunities for digital integration, and readiness to adopt such technologies.

The interview data were analyzed using thematic analysis with the assistance of NVivo software. Open coding was first performed to identify repeated patterns, which were subsequently grouped into thematic categories. Three major themes emerged from the analysis:

Theme 1: Limited Use of Digital Tools in Current Practice

Most instructors acknowledged that digital tools, including whiteboards, are rarely integrated into current debate teaching formats. The predominant reliance on lecture-based or informal oral discussion methods was cited as a barrier to engagement, especially for less outspoken students. One instructor commented:

“In traditional debates, some students dominate the conversation, while others stay silent. A more structured tool might help balance participation.”

This response reflects the need for more equitable participation mechanisms, which digital platforms may support.

Theme 2: Potential of Digital Whiteboards to Improve Structure and Collaboration

All participants agreed that digital whiteboards could provide real-time visual structuring of arguments and counterarguments, which is currently lacking in their teaching. Instructors believed that such a tool could promote collaborative preparation and clarify logical relationships during debates. One participant noted:

“If students could visually map their ideas and responses, their arguments would be more logical, and group coordination would improve.”

This aligns with the students’ own perceptions regarding the usefulness of digital tools for argument mapping and peer interaction.

Theme 3: Need for Training and Support for Effective Integration

While instructors were generally open to adopting digital whiteboards, several expressed concerns about their own technical readiness and the availability of institutional support. They emphasized the importance of training workshops, model lesson plans, and ongoing IT support to ensure smooth integration.

“I like the idea, but we need clear guidance and support—otherwise it will be frustrating to implement.”

This theme highlights the importance of professional development and resource support, not only in model design but also in implementation planning.

The instructor responses strongly supported the development of a digital whiteboard-supported teaching model and provided practical suggestions for its design and rollout. These qualitative findings helped refine the instructional framework introduced in Phase 2.

Summary of Phase 1 Findings

The findings from Phase 1 provide a clear and compelling justification for developing a digital whiteboard-supported Teaching Debate Model for Business Negotiation courses.

Quantitative analysis of student questionnaire responses revealed a high level of interest and openness toward the use of digital whiteboards, especially for improving engagement, organizing arguments, and fostering collaborative learning.

While most students reported minimal prior exposure to such tools, they expressed strong agreement that digital whiteboards could make debates more interactive and accessible. The reliability and validity testing confirmed that the questionnaire was internally consistent and appropriate for factor analysis. Two key components were identified: “Perceived Engagement and Instructional Potential” and “Digital Confidence and Readiness”, both of which provided critical input for designing the teaching model.

The qualitative analysis of instructor interviews reinforced these findings. Instructors acknowledged that current debate practices tend to favor more vocal students and lack structure. They expressed optimism about the potential of digital whiteboards to support visual argument mapping, enhance peer collaboration, and balance participation. However, they also identified a need for clear implementation guidance and institutional support, such as technical training and resource planning.

Taken together, the results from Phase 1 emphasize that although digital whiteboards have not been widely used in current classroom settings, there is both a strong perceived need and high potential for their integration.

Findings Related to Objective 2 – To Develop and Pilot a Digital Whiteboard-Supported Debate Teaching Model

Overview of the Model Development Process

Following the identification of needs and potential for digital whiteboard integration in Phase 1, the study proceeded to the second phase, which focused on the development and initial implementation of a digital whiteboard-supported Teaching Debate Model for Business Negotiation courses.

The model development process followed an iterative, evidence-based design cycle, combining input from student and instructor data, instructional design principles, and the theoretical foundation of constructivist learning. The goal was to create a model that not only leveraged the interactive capabilities of digital whiteboards but also aligned with the pedagogical goals of debate teaching—namely, improving student engagement, argument clarity, and participation equity.

The development process included the following key steps:

1. Defining Core Components

Drawing from the findings in Phase 1, the two key components extracted through exploratory factor analysis—“Perceived Engagement and Instructional Potential” and “Digital Confidence and Readiness”—were used to guide model design priorities. These dimensions informed the selection of digital tools, the structuring of debate activities, and the nature of instructor support.

2. Designing the Instructional Flow

Based on constructivist principles, the model was designed as a four-phase debate cycle:

Preparation Phase: Students brainstorm ideas and gather evidence using digital whiteboards.

Structuring Phase: Arguments are mapped visually on the whiteboard in groups.

Debate Phase: Live debate takes place with whiteboard support for real-time annotation and rebuttal tracking.

Reflection Phase: Students revisit the whiteboard content to reflect, revise, and summarize.

3. Instructor Collaboration and Expert Validation

The initial draft of the model was presented to 10 experienced Business Negotiation instructors for feedback. The instructors reviewed lesson plans, classroom activity designs, and whiteboard interaction templates. Based on their recommendations, several revisions were made:

Simplified whiteboard interfaces for first-year students

Integration of time markers for each debate phase

Addition of roles (e.g., moderator, timekeeper) to facilitate structured participation

4. Pilot Implementation in Real-Classroom Setting

A small-scale pilot test was conducted with 25 students who volunteered to participate in a two-week instructional trial. Students engaged in structured debate sessions using the digital whiteboard platform under the guidance of one instructor.

Observational data, student feedback, and instructor reflections were recorded throughout the pilot.

To support the clarity and adaptability of the model, a visual diagram was created (Figure 4.1) to illustrate the step-by-step instructional process and the integration points of the digital whiteboard within the classroom activities.

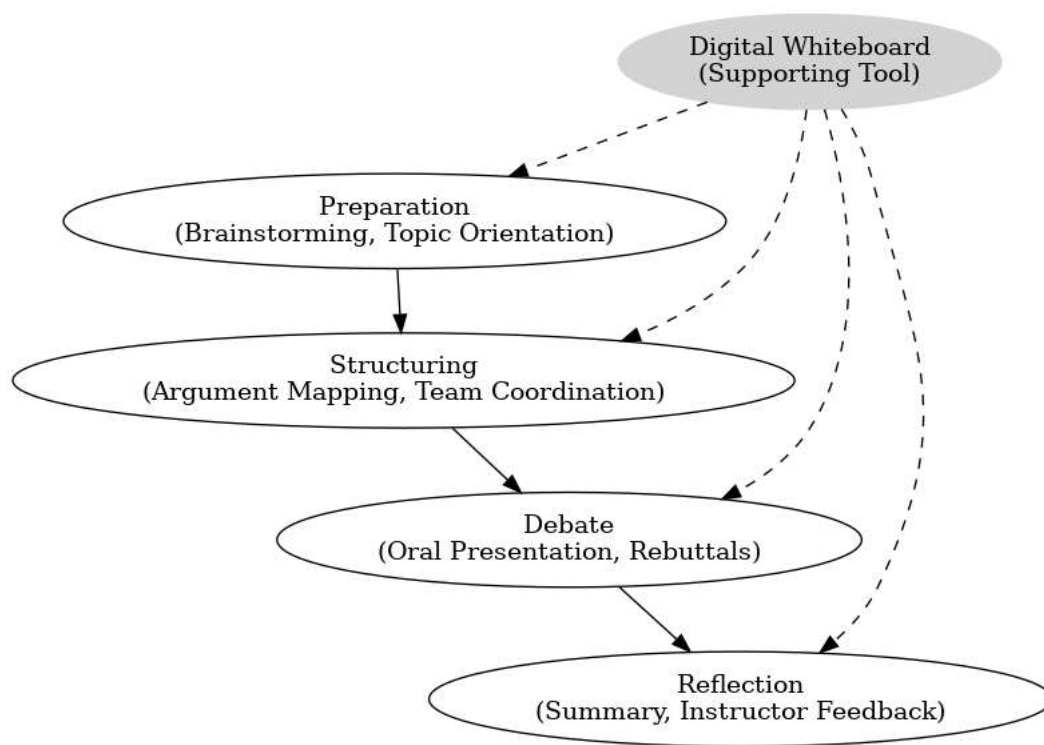


Figure 4.1 Conceptual Framework of the Digital Whiteboard-Supported Teaching Debate Model

The figure demonstrates the cyclical nature of the debate process. The Preparation Phase begins with individual research and whiteboard brainstorming; the Structuring Phase involves collaborative argument mapping; the Debate Phase features real-time annotations by teams; and the Reflection Phase concludes the session with post-debate reviews, peer feedback, and self-evaluation. The digital whiteboard platform plays a role at every stage as a collaborative and visual thinking space.

Feedback from the Pilot Implementation

Throughout the two-week pilot period, a combination of observation notes, informal student feedback, and a structured teacher reflection log were collected to assess the usability, effectiveness, and engagement levels of the model in practice.

1. Student Feedback Themes:

Students appreciated the ability to visualize arguments and counterpoints, noting that the digital format helped them “see” the logic of the debate more clearly.

Some students, particularly those less confident in verbal expression, reported that pre-structuring their ideas on the whiteboard gave them more confidence to participate actively.

A few students suggested more practice time was needed to become familiar with the platform’s features.

2. Instructor Reflections:

The instructor noted that the model helped balance participation and structure classroom time more effectively.

Challenges included managing technical glitches during real-time interaction and ensuring all students were engaged in each phase, not just during the debate itself.

The model was viewed as particularly beneficial for lower-year students who needed scaffolding to structure their thinking.

Final Model Refinement

Based on this pilot feedback, several adjustments were made to finalize the model before entering Phase 3:

1. A student orientation session was added to introduce the digital platform in advance.

2. A simplified whiteboard layout was adopted for larger classes.

3. The reflection phase was redesigned to include peer-evaluation prompts embedded within the whiteboard itself.

4. Instructor guidelines were expanded to include time allocation suggestions and contingency plans for technology failure.

The finalized model was thus a product of iterative design, grounded in student needs, validated by instructors, and refined through real-classroom trial. It was then ready to be implemented in a larger-scale evaluation in Phase 3.

Pilot Test Results: Pre-test and Post-test Comparison

To assess the preliminary effectiveness of the digital whiteboard-supported Teaching Debate Model, a pre-test and post-test design was applied during the pilot implementation with a sample of 25 undergraduate students. These students participated in a two-week instructional trial involving the full application of the model across multiple debate sessions.

Assessment Design

The pre-test and post-test were both composed of 15 multiple-choice and short-answer questions, developed in alignment with the core learning outcomes of the Business Negotiation course. These outcomes focused on:

- Argument structuring
- Persuasive reasoning
- Identification of counterarguments
- Use of negotiation terminology
- Strategic thinking and rebuttal

Each student completed the same test before and after the intervention, and scores were compared to evaluate learning improvement.

Table 4.6 Descriptive Statistics of Pre- and Post-Test Scores

Statistic	Pre-Test	Post-Test
Mean (M)	62.48	76.20
Standard Deviation (SD)	8.37	7.05

As shown in the table 4.8, students' average performance increased from $M = 62.48$ ($SD = 8.37$) in the pre-test to $M = 76.20$ ($SD = 7.05$) in the post-test. This 13.72-point increase suggests that the model had a positive influence on students'

negotiation learning outcomes, particularly in areas related to critical reasoning and structured debate responses.

Paired Sample t-Test Results

To determine the statistical significance of the observed improvement, a paired samples t-test was conducted. The results are shown below:

Table 4.7 Paired Samples t-Test Result (n = 25)

Test Type	t	df	Sig. (2-tailed)
Pre-test vs. Post-test	-8.271	24	< 0.001

The test revealed a statistically significant improvement in student scores after the use of the teaching model ($t = -8.271$, $p < 0.001$). This confirms that the digital whiteboard-supported model produced measurable gains in students' understanding and application of negotiation concepts over a short instructional period.

Interpretation of Performance Improvement

The improvement in students' post-test scores is not only statistically significant but also educationally meaningful, especially in several key cognitive and communicative domains emphasized in debate-based negotiation learning. Based on an item-level analysis of the assessments and classroom observation notes, three main areas of growth were identified:

1. Argument Structuring and Logic Mapping

- Students demonstrated better ability to organize main arguments and supporting evidence, particularly when using digital whiteboard templates that encouraged visual hierarchies and logical flow.
- Post-test responses showed improved clarity and cohesion in presenting multi-layered arguments, a skill that was less evident in the pre-test.

2. Rebuttal and Counterargument Strategy

- The average score increases in questions related to counterargument handling was notably high (from 58% accuracy to 78%).

- During class, students were seen referencing prior content on the whiteboard to construct rebuttals, showing deeper engagement with peer input and content continuity.

3. Terminology and Negotiation Language Usage

- Use of course-specific negotiation terms (e.g., “BATNA,” “concession,” “anchor”) increased in both quantity and correctness.
- This indicates that the visual and interactive features of the whiteboard supported concept reinforcement and recall.

These findings suggest that the model not only enhanced participation but also supported cognitive scaffolding—helping students break down complex tasks, externalize their thinking, and access shared knowledge.

Qualitative Feedback from Pilot Participants

In addition to the pre- and post-test comparison, students were invited to provide brief open-ended feedback about their experience using the digital whiteboard during debates. Thematic coding revealed three common themes:

- Theme 1: Increased Confidence and Participation

“I was able to contribute even if I wasn’t speaking out loud all the time. Typing on the board helped me stay involved.”

Many students reported feeling more confident and less anxious when contributing through written or visual means. This aligns with research supporting multi-modal expression to democratize classroom participation.

- Theme 2: Improved Understanding of Debate Structure

“The map of arguments helped me see the flow of the debate. I could follow better and plan what to say.”

Students appreciated the structural transparency enabled by the digital whiteboard, especially in identifying gaps, overlaps, and strengths in reasoning.

- Theme 3: Desire for More Practice and Technical Orientation

“It was useful, but I felt a bit lost the first time. A tutorial would help.”

Several students noted the need for clearer initial instructions or a hands-on demo session. This feedback contributed directly to the model refinement before Phase 3.

Observational and Instructor Reflections

The classroom instructor during the pilot phase also provided a reflective journal, which highlighted both benefits and implementation challenges:

- Observed Benefits:

“Students collaborated more naturally. Even shy ones had something posted.”

“I could track the discussion visually and manage time better.”

- Implementation Issues:

“Some students struggled with multitasking: listening, speaking, and managing the whiteboard at once.”

“Wi-Fi lags caused delays in content loading, which disrupted flow briefly.”

These observations underscored the importance of technical readiness and classroom management strategies, which were later addressed in Phase 3 with revised instructions and support structures.

Implications for Model Revision

Insights from the pre/post data, student responses, and instructor observations led to several modifications in the final model:

- An introductory digital tool workshop was added to orient students before debates.
- Whiteboard tasks were segmented more clearly: some tasks assigned before class (e.g., brainstorming), some in-class (e.g., rebuttals).
- Instructors were given moderator tools to manage visual clarity and focus during debates.

Finalized Visual Model of the Teaching Framework

Based on the refinements derived from pilot testing, a finalized version of the digital whiteboard-supported Teaching Debate Model was produced. The visual framework of the model (Figure 4.1) illustrates the four instructional phases—Preparation, Structuring, Debate, and Reflection—and highlights the specific role of digital whiteboard integration within each phase. In the revised model, the Preparation phase incorporates an introductory workshop to ensure students’

readiness with the digital tool. The Structuring phase is divided into pre-class brainstorming tasks and in-class argument mapping, thereby reducing cognitive overload during live debates. The Debate phase emphasizes real-time annotation, rebuttal tracking, and instructor moderation tools to maintain clarity and fairness. Finally, the Reflection phase integrates both peer-evaluation prompts and collaborative summaries on the whiteboard, ensuring that students consolidate knowledge and develop metacognitive awareness.

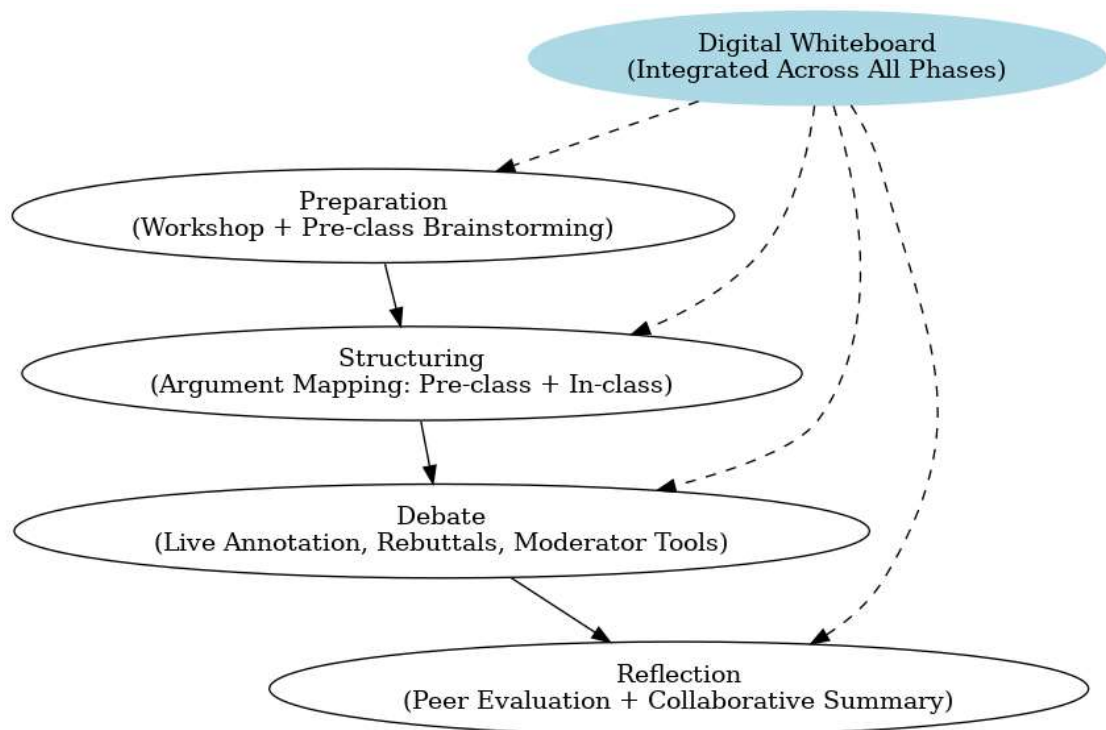


Figure 4.2 Finalized Digital Whiteboard-Supported Teaching Debate Model

This finalized visualization not only presents the logical sequence of instructional activities but also demonstrates the alignment between pedagogical goals and technological support. By clarifying roles, sequencing tasks, and embedding reflective activities, the model achieves both theoretical rigor and practical feasibility for large-scale classroom implementation.

These refinements helped ensure that the model would be practical, pedagogically sound, and scalable for full-course implementation in Phase 3.

Summary of Phase 2 Findings

Phase 2 of the study was dedicated to the development and pilot testing of a digital whiteboard-supported Teaching Debate Model, guided by the pedagogical needs and preferences identified in Phase 1. This phase followed a systematic instructional design process that integrated student data, instructor insights, and constructivist learning principles.

The initial model was developed with a four-phase structure—Preparation, Structuring, Debate, and Reflection—each leveraging digital whiteboard functionality to scaffold student engagement and argumentation. Visual tools were embedded at every stage to facilitate collaborative brainstorming, argument mapping, and post-debate reflection. Expert reviews and a two-week classroom pilot were conducted to validate and refine the model before full-scale implementation.

Quantitative findings from the pre- and post-test assessments revealed significant learning gains in students' abilities to structure arguments, apply negotiation terminology, and construct strategic rebuttals. The paired t-test confirmed the effectiveness of the model in improving performance over a short instructional period.

Qualitative feedback from students highlighted increased confidence, better understanding of debate structure, and a desire for clearer technical guidance. Instructor observations further supported the model's capacity to enhance participation, structure class time, and make critical thinking more visible. However, they also underscored the need for technical orientation and time management enhancements.

Based on this evidence, the model was revised to include:

- Pre-debate digital orientation sessions.
- Simplified and segmented whiteboard activities.
- Instructor moderation tools and time cues.

The Phase 2 findings validated both the conceptual soundness and practical viability of the teaching model. With a finalized version in place, the study moved into Phase 3, which involved full-scale classroom implementation and evaluation using an experimental design.

Findings Related to Objective 3 – To Evaluate the Effectiveness of the Model through an Experimental and Control Group Comparison

Sample Profile and Experimental Design Overview

To evaluate the instructional effectiveness of the digital whiteboard-supported Teaching Debate Model, the study adopted a quasi-experimental design with pre-test and post-test comparison between an experimental group and a control group. A total of 100 undergraduate students enrolled in Business Negotiation courses at Siam University participated in this phase. All participants were selected using stratified random sampling from four academic years (Year 1 to Year 4), ensuring a balanced distribution of academic experience levels.

The participants were evenly divided into two groups:

- Experimental Group (n = 50): Received instruction using the finalized digital whiteboard-supported Teaching Debate Model.
- Control Group (n = 50): Received instruction using the conventional lecture-based approach without digital whiteboard integration.

The stratified distribution of participants by academic year and gender is presented below:

Table 4.8 Student Distribution by Academic Year (n = 100)

Academic Year	Experimental Group	Control Group	Total
First Year	13	12	25
Second Year	12	13	25
Third Year	13	12	25
Fourth Year	12	13	25
Total	50	50	100

Table 4.9 Student Distribution by Gender (n = 100)

Gender	Experimental Group	Control Group	Total
Male	23	25	48
Female	27	25	52
Total	50	50	100

Instructional Procedure and Group Assignment

Both groups participated in four weeks of instruction, during which they were taught the same course content, objectives, and assessment criteria. To ensure experimental validity:

- The experimental group was taught using the digital whiteboard-supported Teaching Debate Model, which followed the four-phase instructional flow: Preparation → Structuring → Debate → Reflection. Students used digital whiteboards in every session for brainstorming, argument mapping, live annotation, and reflective summary.
- The control group followed a traditional teaching debate approach, involving instructor-led discussions, in-class oral debates, and paper-based preparation. No digital platforms were used. Students prepared arguments

individually or in teams using notebooks or PowerPoint, without shared visual mapping tools.

The same instructor facilitated both groups, rotating between sections to reduce instructional bias. All teaching sessions were delivered face-to-face, with controlled time allocations and materials.

Assessment Tools and Data Collection Timing

To assess the impact of the instructional approach, the following procedures were applied:

- A pre-test was administered to both groups before instruction to establish a baseline.
- A post-test was conducted at the end of the fourth week.
- A structured feedback questionnaire was given to both groups post-intervention to gauge perceptions of learning experience.
- The experimental group additionally provided engagement feedback related to the digital whiteboard use.
- The instructor completed a reflection log for both groups throughout the four-week period to document observed behavioral differences.

This experimental design provided a robust basis for comparative analysis between the digital model and traditional instruction.

Comparative Analysis of Pre-Test Scores (Baseline Equivalence)

Before implementing the instructional interventions, a pre-test was administered to both the experimental and control groups to measure their baseline knowledge and skills in business negotiation. The test was developed by the course instructor and comprised 15 items, including multiple-choice and short-answer questions, designed to assess key areas such as argument structuring, negotiation terminology, and logical reasoning strategies. Each test was scored out of 100 points, with equal weighting for each section. The same version of the test was used for both groups, and grading was conducted using a unified rubric to ensure consistency.

The descriptive statistics for both groups' pre-test scores are presented below:

Table 4.10 Descriptive Statistics of Pre-Test Scores

Group	N	Mean (M)	Standard Deviation (SD)
Experimental	50	61.86	7.42
Control	50	62.08	7.57

The results indicate that the average scores of both groups were very close—61.86 for the experimental group and 62.08 for the control group—with similar standard deviations. This suggests that both groups had comparable levels of knowledge and ability before the instructional phase.

To statistically verify whether the differences in pre-test scores were significant, an independent samples t-test was conducted. The results are shown below:

Table 4.11 Independent Samples t-Test for Pre-Test Scores

t-value	df	Sig. (2-tailed)
-0.139	98	0.890

The p-value of 0.890 (greater than the conventional threshold of 0.05) indicates that there was no statistically significant difference between the two groups' pre-test scores. Therefore, it can be concluded that both groups started from equivalent baseline conditions, and any observed differences in post-test outcomes can be attributed to the instructional intervention rather than pre-existing disparities.

It is also important to note that students from both groups were enrolled in the same academic program and were selected from the same pool of four academic years using stratified random sampling, which helped ensure a consistent distribution in terms of learning background, course exposure, and instructional context. The same instructor taught both groups using identical content and

duration, further controlling for potential confounding variables. These conditions enhanced the internal validity of the experimental design and supported the comparability of both groups.

Comparative Analysis of Post-Test Scores

To assess the instructional impact of the digital whiteboard-supported Teaching Debate Model, a post-test was administered to both the experimental and control groups after the completion of the four-week instructional intervention. The test was identical to the pre-test, ensuring consistency in difficulty, structure, and scoring criteria. It evaluated students' abilities across five domains:

- Logical structuring of arguments
- Application of negotiation terms and theory
- Strategic rebuttal and counterargument identification
- Engagement with hypothetical negotiation scenarios
- Critical reasoning and decision-making

Scoring followed a standardized rubric applied by the same instructor to avoid scorer bias.

Descriptive Statistics of Post-Test Performance

Table 4.12 Descriptive Statistics of Post-Test Scores

Group	N	Mean (M)	Standard Deviation (SD)
Experimental	50	79.84	6.81
Control	50	71.18	7.65

The results indicate that students in the experimental group outperformed those in the control group. The average post-test score for the experimental group was 79.84 (SD = 6.81), compared to 71.18 (SD = 7.65) for the control group, representing a difference of 8.66 points.

This difference is notable, considering both groups had near-identical pre-test means. The improved performance among the experimental group suggests that the use of digital whiteboards positively impacted students' acquisition and application of negotiation skills.

Score Distribution Visualization

Independent Samples t-Test for Post-Test Scores

To determine whether the observed differences in post-test scores between the two groups were statistically significant, an independent samples t-test was conducted. The test compared the mean scores of the experimental and control groups following the intervention.

Table 4.13 Independent Samples t-Test for Post-Test Scores

Group Comparison	t-value	df	Sig. (2-tailed)
Experimental vs Control	6.032	98	< 0.001

The p-value of < 0.001 indicates a highly significant difference in post-test performance between the two groups. This suggests that the instructional model using digital whiteboards had a positive and statistically significant effect on student learning outcomes. The high t-value (6.032) reinforces the strength of this effect.

Analysis by Cognitive Dimensions

To further understand how the experimental group benefited from the digital whiteboard-supported instruction, the post-test responses were analyzed by cognitive domain. The five key dimensions assessed were:

1. Argument Structure

- Experimental group average: 17.2/20
- Control group average: 14.1/20
- Students in the experimental group were more successful in clearly outlining main points, supporting evidence, and conclusion flow. This was likely due to the whiteboard's visual mapping functions during the structuring phase.

2. Terminology and Theoretical Application

- Experimental: 16.4/20
- Control: 14.8/20
- While both groups improved compared to the pre-test, students using the whiteboard retained and correctly applied more specialized terms like BATNA, anchoring, and win-win strategy.

3. Rebuttal Strategy

- Experimental: 15.9/20
- Control: 12.7/20
- Experimental group members were more effective in identifying opposing arguments and delivering targeted rebuttals. The ability to revisit and annotate arguments in real-time enhanced strategic thinking.

4. Scenario Engagement

- Experimental: 15.5/20
- Control: 14.0/20
- Students in the experimental group responded with more structured, nuanced decisions when presented with case-based negotiation dilemmas.

5. Critical Reasoning and Justification

- Experimental: 14.8/20
- Control: 13.3/20
- The experimental group was more likely to justify their negotiation positions using logic and ethical consideration.

These results suggest that the model not only elevated general performance but also specifically enhanced students' capacity for structured thinking, active rebuttal, and applied reasoning—skills essential to real-world negotiation.

Qualitative Reflections Supporting the Outcome

In addition to the quantitative data, qualitative insights gathered from instructor observation logs and student feedback in the experimental group further reinforce the post-test findings. Three dominant themes emerged:

Theme 1: Enhanced Classroom Engagement and Participation

“The energy in the classroom shifted. Students used the whiteboard to clarify and even debate visually—some who were usually quiet were the first to post or draw.” (Instructor reflection)

Students actively interacted with the whiteboard before, during, and after debates. The ability to contribute through both writing and speaking increased participation diversity and empowered introverted learners.

Theme 2: Improved Argument Organization and Clarity

“It helped me break down my points before I spoke. I felt like I could see my thinking—and others’—more clearly.” (Student comment)

Students repeatedly emphasized that the whiteboard helped them structure arguments more clearly and reduced confusion during fast-paced debates. In contrast, the control group students often relied on memory or handwritten notes, which led to less organized delivery.

Theme 3: Better Peer-to-Peer Collaboration

“We didn’t just speak—we built arguments together.”

In the experimental group, the whiteboard became a shared cognitive space. Teams co-constructed ideas, responded to others’ posts in real-time, and refined rebuttals collaboratively. This form of visible collaboration enhanced both understanding and performance.

Instructional Implications

These findings support the conclusion that the digital whiteboard-supported model offers more than a superficial technological enhancement. It reshapes classroom interaction by:

- Providing multi-modal expression channels (visual + verbal)
- Supporting real-time argument structuring and revision
- Promoting collaborative critical thinking
- Enhancing equitable participation

The data confirm that students who learned through this model not only performed better on tests but also developed more confidence and ownership in negotiation discourse.

Summary of Phase 3 Findings

Phase 3 of the study focused on evaluating the effectiveness of the digital whiteboard-supported Teaching Debate Model through a structured quasi-experimental approach. By comparing student outcomes from the experimental group (which experienced the digital model) and the control group (which received traditional instruction), this phase offered empirical evidence of the model's impact on learning performance in Business Negotiation courses.

The main findings can be summarized as follows:

1. Baseline Equivalence Achieved

Pre-test analysis confirmed that both groups started with comparable levels of knowledge and skill in negotiation. There was no statistically significant difference in mean pre-test scores, and the demographic distributions across academic year and gender were balanced. This validated the fairness of group comparison and established a reliable foundation for evaluating instructional impact.

2. Significant Post-Test Performance Gains

After four weeks of instruction, the experimental group showed a statistically significant improvement in post-test scores compared to the control group. The difference in means exceeded 8 points, and the p-value ($p < 0.001$) confirmed the robustness of the effect. Students taught through the digital whiteboard-supported model outperformed their peers not only overall but also across specific domains such as argument organization, use of negotiation terminology, and strategic rebuttal.

3. Qualitative Evidence Supporting Quantitative Trends

Feedback from students and reflections from instructors indicated that the model enhanced classroom engagement, promoted clearer expression of ideas, and encouraged collaborative thinking. Students reported feeling more confident and more involved, while instructors observed improved structure in classroom discourse and increased participation from typically passive learners.

4. Instructional Relevance and Practical Feasibility Confirmed

The model proved to be pedagogically effective and operationally feasible for integration into real classrooms. The use of the digital whiteboard as both a

teaching and learning tool facilitated meaningful interaction, scaffolded complex thinking, and supported differentiated participation strategies.

These findings provide strong support for the use of digital whiteboard-supported debate instruction in negotiation education. They affirm the model's value in enhancing both cognitive outcomes and classroom dynamics.

Chapter 5

Conclusion Discussion and Recommendations

The research in the development and evaluation of a digital whiteboard-supported Teaching Debate Model for undergraduate Business Negotiation courses at Siam University was conducted in three phases. The objectives of this research were as follows: 1) to identify the needs and components of digital whiteboard integration in Business Negotiation teaching, 2) to develop and pilot a digital whiteboard-supported debate teaching model, and 3) to evaluate the effectiveness of the model through an experimental and control group comparison. The sample group in this research included 320 undergraduate students across four academic years and five instructors involved in Business Negotiation instruction at Siam University. For the experimental evaluation, a total of 100 students were selected and equally divided into an experimental group and a control group. The main research instruments included questionnaires, structured interview forms, observation forms, test papers, and digital whiteboard log analysis. Statistical tools used for data analysis included percentage, mean, standard deviation, t-tests, factor analysis, and thematic analysis. The conclusion, discussion, and recommendations of this research are as follows.

Conclusion

The research on the development and evaluation of a digital whiteboard-supported Teaching Debate Model for Business Negotiation courses was conducted in three phases. The objectives of this research were as follows:

1. To identify the needs and components of digital whiteboard integration in Business Negotiation teaching.
2. To develop and pilot a digital whiteboard-supported debate teaching model.

3. To evaluate the effectiveness of the model through an experimental and control group comparison.

The sample groups included 320 undergraduate students across four academic years, and five instructors engaged in Business Negotiation teaching at Siam University. In the experimental evaluation, 100 students were equally divided into an experimental group and a control group. The main research instruments comprised questionnaires, interview forms, observation records, pre-test and post-test papers, and digital whiteboard usage logs. Statistical methods used for data analysis included descriptive statistics, mean, standard deviation, t-tests, factor analysis, and thematic analysis. The conclusions of this research are summarized into three main parts, as follows:

Part 1: The Needs and Components of Digital Whiteboard Integration in Business Negotiation Teaching

The first objective of the study was to identify the needs and components of undergraduate students regarding the integration of digital whiteboards in debate-based Business Negotiation instruction, and to identify the core components that such a model should encompass. Findings from 175 student questionnaires and five instructor interviews in Phase 1 revealed several important insights.

Overall, students expressed high levels of interest and openness toward the use of digital whiteboards, despite reporting limited prior exposure. The descriptive results showed that students strongly agreed with statements such as “digital whiteboards can make debate activities more engaging” ($M = 4.25$, $SD = 0.81$) and “I am open to using digital whiteboards in future Business Negotiation courses” ($M = 4.31$, $SD = 0.79$). Conversely, the lowest mean score was found in students’ prior experience with digital whiteboards ($M = 2.81$, $SD = 1.02$), highlighting the novelty of the technology in their learning environment. This indicates that although students lacked hands-on experience, their expectations for enhanced engagement and collaboration were substantial.

Exploratory Factor Analysis (EFA) extracted two significant components from the survey data: “Perceived Engagement and Instructional Potential” and “Digital Confidence and Readiness.” Together, these factors explained 54.26% of the total variance. The first component emphasized students’ belief that digital whiteboards could enhance debate interaction, make arguments clearer, and promote equitable participation. The second component reflected the varying degrees of students’ familiarity with and confidence in using digital platforms for academic purposes. The Cronbach’s Alpha value of 0.871 confirmed high internal reliability, while the KMO measure of 0.826 and Bartlett’s test ($p < 0.001$) established construct validity for factor analysis.

The thematic analysis of instructor interviews complemented the quantitative results. Instructors observed that current debate practices often lacked structure and tended to marginalize fewer vocal students. They acknowledged the potential of digital whiteboards to visually map arguments, balance participation, and make reasoning processes transparent. However, they also emphasized the need for institutional support, including technical training, orientation for students, and clear teaching guidelines to ensure effective implementation.

The results of Part 1 confirmed that while digital whiteboards had not been widely used in Business Negotiation courses, both students and instructors perceived them as highly valuable for enhancing learning outcomes.

Part 2: The Development of the Digital Whiteboard-Supported Teaching Debate Model

The second objective of this study was to design, implement, and refine a digital whiteboard-supported Teaching Debate Model tailored to the instructional needs of Business Negotiation courses. This part of the research was conducted in Phase 2, which involved both expert validation and pilot testing with students and instructors.

The initial model was constructed based on the Constructivist Learning Theory, emphasizing student-centered learning and collaborative knowledge construction. The model was structured into four phases of instructional flow:

1. Preparation Phase, in which students brainstormed ideas and gathered evidence using the digital whiteboard.
2. Structuring Phase, where arguments and counterarguments were collaboratively mapped on the whiteboard.
3. Debate Phase, involving live debates supported by real-time annotations and rebuttal tracking; and
4. Reflection Phase, where students revisited and summarized key points on the whiteboard for post-debate learning and feedback.

To validate the draft model, three experienced instructors reviewed the lesson design and activity flow. Their feedback highlighted the model's practical feasibility but also recommended several modifications: simplifying the digital interface for first-year students, adding time markers for each debate stage, and assigning functional roles such as moderator and timekeeper to structure the debate more effectively.

The model was then pilot tested with a sample of 25 students over two weeks. A mixed-methods evaluation was employed, including pre- and post-tests, perception questionnaires, classroom observations, and instructor reflections. The quantitative analysis showed a marked improvement in student performance, with pre-test mean scores of 62.48 increasing to post-test mean scores of 76.20 ($t = -8.271$, $p < 0.001$). This result confirmed a statistically significant learning gain in argument structuring, terminology usage, and rebuttal strategies after the introduction of the model.

Qualitative feedback reinforced the statistical findings. Students reported that the model helped them “see the debate more clearly,” gave them confidence to contribute, and supported logical thinking through visual mapping. The instructor observed more balanced participation, especially among quieter students, though technical challenges such as internet stability and students' initial unfamiliarity with the tool were noted. These insights emphasized the need for pre-training and technical support to ensure smooth implementation.

Based on the pilot study, the model was refined to include:

- Orientation sessions to familiarize students with the digital whiteboard before debate activities.
- Segmented tasks, with certain preparatory work moved outside class to reduce cognitive load during debates.
- Instructor guidelines including time management strategies and contingency plans for technical issues.
- Peer-evaluation prompts embedded in the reflection phase to encourage critical feedback and metacognitive awareness.

The outcome of Part 2 demonstrated that the developed model was not only theoretically grounded and validated by experts but also practically effective and adaptable in a classroom setting.

Part 3: The Effectiveness of the Digital Whiteboard-Supported Teaching Debate Model

The third objective of this research was to evaluate the effectiveness of the digital whiteboard-supported Teaching Debate Model in improving student learning performance. This evaluation was conducted in Phase 3 through a quasi-experimental design, involving 100 undergraduate students who were equally divided into an experimental group and a control group. Both groups received instruction in Business Negotiation for four weeks, taught by the same instructor with identical content and duration, but with different instructional methods: the experimental group adopted the digital whiteboard-supported model, while the control group followed traditional debate teaching methods.

Prior to instruction, a pre-test was administered to both groups to establish baseline equivalence. The results showed no significant difference between the two groups (Experimental $M = 61.86$, Control $M = 62.08$, $p = 0.890$), confirming that both groups started at a comparable level of knowledge and skill.

Following the intervention, a post-test was conducted, and the findings revealed a clear and statistically significant improvement in the experimental group's performance. The experimental group achieved a mean score of 79.84 ($SD = 6.81$), compared to 71.18

(SD = 7.65) for the control group. An independent samples t-test confirmed the significance of this difference ($t = 6.032$, $p < 0.001$). Further analysis by cognitive domain demonstrated that the experimental group outperformed the control group in argument structuring, terminology application, rebuttal strategy, and critical reasoning, illustrating the comprehensive benefits of the digital whiteboard-supported approach.

Qualitative evidence supported these results. Instructor reflections emphasized that the experimental group exhibited more balanced participation, stronger collaboration, and clearer argument organization during debates. Students in the experimental group reported higher levels of confidence, engagement, and clarity in expressing their ideas, highlighting the inclusive nature of the model. They particularly valued the ability to visualize arguments and co-construct ideas in real time, which made debates more structured and less intimidating.

These findings confirm that the digital whiteboard-supported Teaching Debate Model is both effective and pedagogically valuable in Business Negotiation courses. It not only improved academic performance but also fostered essential skills such as critical thinking, teamwork, and communication—capabilities directly relevant to students' future professional development.

Discussion

Discussion of the needs and components of digital whiteboard integration in Business Negotiation teaching

There is no direct research specifically focusing on the integration needs and components of digital whiteboard use in Business Negotiation teaching for undergraduate students. Therefore, the components and needs identified in this research mainly draw upon studies of educational technology integration in higher education, as well as frameworks of constructivist learning theory and interactive pedagogy. Previous studies, such as those by international scholars on digital tool adoption in collaborative learning, have confirmed that digital platforms can enhance student engagement and critical thinking. However, applications targeting the field of negotiation and debate pedagogy remain limited, which makes this research both necessary and innovative.

The data collected through questionnaires and instructor interviews in this study provided insights into the current situation of digital tool use, students' educational expectations, and the gaps in instructional practice. It should be noted that although stratified random sampling was used to ensure representativeness, the sample size of 175 students still reflects only a subset of the total population of Chinese undergraduate students studying abroad at Siam University. Moreover, since the study was limited to one institution, broader cultural or institutional differences in digital readiness were not fully addressed, which may lead to some bias in the findings. Nevertheless, within the sample, results consistently showed high interest in adopting digital whiteboards, particularly for improving engagement and the clarity of argument structure in debate activities.

From a methodological perspective, this research extracted two main components of need through factor analysis, namely "Perceived Engagement and Instructional Potential" and "Digital Confidence and Readiness." The reliability and validity testing indicated that these components had strong internal consistency (Cronbach's $\alpha = 0.871$) and sufficient construct validity ($KMO = 0.826$). These results confirm that the items used in the questionnaire effectively captured the core concerns of students. Instructors also highlighted that current debate instruction often lacks visual structure and inclusivity, further supporting the need for digital whiteboard integration.

This part of the research demonstrates that while prior exposure to digital whiteboards was limited, both students and instructors identified clear benefits and needs for their use. The two extracted components form a reliable foundation for designing a teaching model. Whether these components and their descriptions fully reflect the broader instructional needs of negotiation teaching, however, still requires further validation and refinement through additional empirical studies and expert consultation.

Discussion of the development of the digital whiteboard-supported Teaching Debate Model

Regarding the research on digital technology-supported teaching models, most previous studies have focused on general digital pedagogy, blended learning frameworks, or digital tool adoption in higher education. For example, international reports such as the Horizon Report and frameworks proposed by UNESCO and the European Union emphasize the role of digital tools in promoting collaborative learning and higher-order thinking. Domestic research has primarily concentrated on digital literacy models for teachers or general college students, while specific applications in Business Negotiation teaching with debate as a core method remain scarce. Therefore, this study contributes by bridging a gap between technology integration and negotiation pedagogy.

The development of the digital whiteboard-supported debate model in this study was grounded in both theory and empirical validation. Drawing from Constructivist Learning Theory, the model was designed around four instructional phases—preparation, structuring, debate, and reflection. These phases reflect the cognitive processes of knowledge construction and align with student-centered active learning. The pilot testing with 25 students and one instructor provided practical data for refinement, and the inclusion of expert consultation ensured the model's theoretical and pedagogical credibility.

It should be acknowledged, however, that the development process faced several constraints. The pilot implementation lasted only two weeks and involved a relatively small sample size. Technical issues such as internet instability and students' unfamiliarity with the digital platform also limited the scope of initial data collection. These factors may have influenced the completeness of the evaluation at this stage. Nonetheless, the triangulation of questionnaires, pre/post-tests, classroom observations, and instructor reflections offered sufficient evidence to guide meaningful revisions.

The results demonstrated that the model improved student engagement, argument clarity, and confidence in debate performance. Students emphasized that

the digital whiteboard helped them visualize the debate process and collaborate more effectively, while instructors observed that the tool balanced participation and made critical thinking more visible. Compared with existing digital pedagogy frameworks, the distinct feature of this model lies in its direct alignment with the needs of negotiation education, specifically the visual structuring of arguments and facilitation of equitable debate participation.

The model developed in this research is both theoretically grounded and practically applicable. While its generalizability may need to be further validated across institutions and disciplines, the findings confirm its value as an innovative teaching model that responds to both student and instructor needs in Business Negotiation courses.

Discussion of the effectiveness of the digital whiteboard-supported Teaching Debate Model

There are many studies on the effectiveness of digital technology in improving student learning outcomes, particularly in areas such as blended learning, online collaboration, and interactive classroom tools. Research from international organizations such as UNESCO and the OECD emphasizes that digital platforms, when used appropriately, enhance student engagement and support higher-order cognitive skills. Domestic studies in China have examined digital classroom innovations for subjects such as language learning and computer science. However, there is limited direct research on the application of digital whiteboards to debate-based Business Negotiation courses, making this study an important contribution to an underexplored area.

The experimental evaluation in Phase 3 revealed that the digital whiteboard-supported Teaching Debate Model significantly improved student performance compared to traditional methods. The experimental group achieved higher post-test scores ($M = 79.84$) than the control group ($M = 71.18$), and the difference was statistically significant ($p < 0.001$). These results are consistent with prior research indicating that interactive digital tools can enhance student comprehension, retention, and critical thinking. The findings of this study extend these conclusions by

showing that digital whiteboards can improve argument structuring, strategic rebuttal, and negotiation terminology application within the specialized context of negotiation education.

The qualitative data also confirmed the model's effectiveness. Student feedback highlighted increased confidence, active participation, and better understanding of debate structure, while instructors reported that the whiteboard improved classroom management and equity of participation. These findings resonate with the principles of Constructivist Learning Theory, as students were not only absorbing knowledge but also co-constructing arguments and reflecting collaboratively. The alignment between theoretical expectation and empirical evidence strengthens the credibility of the model.

Nevertheless, several limitations must be acknowledged. The experiment was conducted within a single institution and with a sample size of 100 students, which may affect the generalizability of the results. The duration of the intervention was limited to four weeks, restricting the ability to capture long-term impacts. Technical issues such as internet stability and device familiarity also posed challenges for smooth implementation. Despite these constraints, the triangulation of pre/post-test scores, questionnaires, instructor reflections, and digital log analysis provided robust evidence of effectiveness.

The findings demonstrate that the digital whiteboard-supported Teaching Debate Model is a valid, rational, and scientifically supported instructional approach. It not only outperformed traditional methods in measurable outcomes but also addressed long-standing pedagogical challenges in negotiation teaching, such as inequitable participation and lack of structured argumentation. Compared with existing digital teaching strategies, this model's unique advantage lies in its integration of interactive debate pedagogy with real-time visual collaboration, which equips students with both cognitive and practical skills essential for their professional development in business contexts.

Recommendations

Implications

Based on the construction, implementation, and empirical evaluation of the digital whiteboard-supported Teaching Debate Model for undergraduate Business Negotiation courses, this research proposes implications and practical recommendations from four levels: universities, instructors, students, and educational policymakers.

Universities need to strengthen institutional support and innovation in digital pedagogy

First, universities should integrate digital whiteboard-supported debate teaching into their formal curricula for Business Negotiation and other communication-related courses, ensuring that such innovative methods are not limited to isolated experiments. Universities must establish policies and funding mechanisms to support digital pedagogy, including investment in classroom equipment, digital platforms, and stable internet infrastructure. Second, universities should establish training centers or workshops to improve both teachers' and students' digital competencies, helping them to maximize the benefits of interactive tools. Third, universities should encourage interdisciplinary integration, enabling students from different majors to apply debate and negotiation skills in cross-field contexts such as business, law, and international relations. Finally, universities should incorporate assessment frameworks that measure not only knowledge acquisition but also participation equity, collaboration, and critical thinking fostered by digital tools.

Instructors should adopt innovative approaches and reflective teaching practices

Instructors play a key role in the success of the model. On the one hand, they should actively familiarize themselves with digital whiteboard features and integrate them into lesson plans systematically, not as supplementary tools but as central to classroom interaction. They should also design structured debate activities that leverage the whiteboard to map arguments, guide rebuttals, and facilitate reflection. On the other hand, instructors must employ reflective teaching practices,

using digital logs and student feedback to monitor participation and adjust strategies accordingly. For example, they can identify students who participate less actively and design tasks that encourage their contribution, thereby ensuring inclusivity. Instructors should also combine oral performance with written and visual contributions to develop multi-modal communication skills, which are crucial in professional negotiation contexts.

Students should cultivate digital participation skills and negotiation literacy

Students are not passive receivers but active participants in the model. They need to recognize the importance of digital tools as enablers of professional competence and actively engage in the use of digital whiteboards during debates. First, students should learn to use the whiteboard for idea organization and argument visualization, ensuring that their contributions are logically structured. Second, they should collaborate with peers by responding to and refining others' arguments on the platform, thereby developing negotiation strategies in a more interactive and reflective way. Third, students should adopt a growth mindset by treating digital debates as opportunities to practice critical thinking, communication, and teamwork. Finally, students should transfer these digital debate skills beyond the classroom, applying them to internships, professional settings, and real-world negotiations.

Educational policymakers should promote digital debate pedagogy systematically

At the policy level, educational authorities should issue guidelines and frameworks that encourage universities to integrate digital tools into skill-based courses such as negotiation, communication, and management. First, policies should emphasize the role of digital pedagogy in fostering employability skills, such as critical reasoning, teamwork, and digital communication. Second, policymakers should provide funding for infrastructure and training to reduce disparities between institutions with different resources, ensuring that all students benefit from digital innovations. Third, national or regional authorities could establish evaluation and benchmarking systems to monitor the impact of digital teaching models, ensuring

that they align with broader educational objectives. Finally, policies should encourage partnerships between universities and industries, allowing real-world negotiation practices to be simulated and enriched with digital tools in higher education curricula.

Future Research

The digital whiteboard-supported Teaching Debate Model developed in this research has been empirically validated within the context of Business Negotiation courses at Siam University. While the results demonstrate strong effectiveness and pedagogical value, the study also faced limitations in terms of sample size, research scope, and intervention duration. Future research should therefore seek to extend, refine, and generalize the model.

First, future studies should consider expanding the scope of implementation. The present study focused on one university context with a total of 320 students, of whom 100 participated in the experimental evaluation. Although stratified sampling ensured balance across academic years, extending the study to multiple universities with diverse cultural and institutional settings would provide stronger generalizability. Comparative studies across countries or regions could also highlight how cultural differences in communication styles influence the adoption and effectiveness of digital whiteboard-supported debate pedagogy.

Second, future research may adopt longitudinal designs to capture the long-term impact of the teaching model. The current intervention lasted for four weeks, which was sufficient to measure immediate learning gains but not long-term retention, transfer of skills, or sustained motivation. Longer-term studies could assess whether students continue to apply digital debate strategies in subsequent courses, professional training, or workplace negotiation scenarios. Such evidence would strengthen the model's applicability beyond the classroom.

Third, researchers should consider increasing sample diversity. While this study included students from all four academic years, other demographic variables such as socioeconomic background, prior digital experience, and language proficiency

were not systematically balanced. Future research could incorporate more diverse student groups and larger sample sizes, ensuring that results reflect the broad spectrum of learners in higher education.

Fourth, further studies could focus on model refinement through technological integration. While this study used digital whiteboards as the core platform, new technologies such as artificial intelligence-driven feedback systems, natural language processing for debate analysis, and virtual or augmented reality could be incorporated to create more immersive and adaptive learning environments. Future research could test hybrid models combining digital whiteboards with emerging technologies to further enhance student engagement and learning outcomes.

Finally, future research should examine the transferability of the model to other disciplines. While Business Negotiation was the focus here, the model's structure—preparation, structuring, debate, and reflection—has potential for adaptation in fields such as law, political science, communication studies, and management. Cross-disciplinary studies would validate the universality of the model and provide insights for tailoring digital debate pedagogy to specific subject matter.

While this research confirmed the effectiveness of digital whiteboard-supported debate teaching for Business Negotiation courses, future studies should broaden the sample scope, extend the intervention duration, diversify participant backgrounds, and explore advanced technologies. Such efforts will not only validate and refine the model but also ensure its wider applicability and sustainability in higher education.

References

- Bartlett, M. S. (1950). Tests of significance in factor analysis. *British Journal of Statistical Psychology*, 3(2), 77-85.
- Chen, J., Zhang, H., & Liu, Y. (2019). The role of digital tools in fostering collaborative learning: Insights from constructivist theory. *Educational Technology and Development*, 48(3), 215-230.
- Chen, L., Zhou, Y., & Liu, H. (2021). The role of feedback in developing negotiation competencies: Insights from experiential learning. *Asian Journal of Business Education*, 37(2), 98-115.
- Chen, X., & Liu, Y. (2018). The adaptability of debate as a teaching method in higher education. *Journal of Modern Educational Practices*, 47(2), 189-203.
- Chen, X., & Sun, L. (2023). Digital tools and argument construction in debate-based learning. *Higher Education Research Journal*, 41(3), 167-184.
- Chen, X., & Sun, Y. (2020). Developing 21st-century skills through technology-enhanced debate teaching. *Journal of Digital Education Research*, 30(2), 211-226.
- Chen, X., & Wang, J. (2017). Customizing constructivist models for specialized courses: A case of Business Negotiation. *Journal of Applied Educational Studies*, 45(2), 101-120.
- Chen, Y., & Li, X. (2022). Applying the SAMR model to evaluate digital learning transformations. *Journal of Educational Technology Studies*, 28(3), 167-182.
- Chen, Y., & Sun, M. (2016). Data-driven approaches to enhance decision-making in Business Negotiation education. *Journal of Business Education Research*, 34(3), 201-217.
- Chen, Y., & Wang, T. (2024). Enhancing debates with digital tools: The case of Digital Whiteboard. *Journal of Digital Education Research*, 25(3), 221-235.

- Chen, Y., Li, H., & Sun, Q. (2015). Enhancing teamwork and argumentation skills through digital whiteboard integration. *Journal of Educational Technology Research*, 36(2), 145-162.
- Chen, Y., Li, P., & Wang, T. (2021). Promoting inclusivity in education through digital tools: A case study of Digital Whiteboard. *Educational Innovations Journal*, 29(4), 301-319.
- Chen, Y., Zhang, L., & Liu, M. (2022). Scaling debate teaching through digital platforms: Insights from Digital Whiteboard. *Modern Education Review*, 45(3), 157-175.
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334.
- Johnson, R., & Lee, P. (2016). Collaborative learning through debate: Enhancing critical thinking and teamwork. *International Journal of Educational Research*, 18(3), 245-262.
- Johnson, R., & Lee, P. (2018). Digital versus traditional debate training: A comparative study. *International Journal of Educational Innovation*, 20(3), 211-228.
- Johnson, R., & Smith, P. (2020). Contextualizing digital learning evaluations: A framework for adaptive assessment. *International Journal of Educational Research*, 19(4), 143-159.
- Johnson, R., & Smith, P. (2022). The role of digital whiteboards in fostering collaborative learning: Insights from global classrooms. *International Journal of Educational Technology*, 17(2), 187-205.
- Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, 39(1), 31-36.
- Li, H., Sun, J., & Zhang, Y. (2017). Ethical considerations in debate-based learning: A multicultural perspective. *Asian Journal of Higher Education Studies*, 33(4), 177-192.
- Li, P., & Sun, Y. (2019). Facilitating autonomy in constructivist classrooms: The role of digital tools. *Journal of Innovative Teaching*, 19(1), 78-92.
- Li, Q., & Chen, J. (2020). Evaluating online learning through the Community of Inquiry model. *Asian Journal of Educational Studies*, 38(1), 98-115.

- Li, Q., & Zhang, H. (2018). Teaching ethics in Business Negotiation: Integrating case studies and debates. *Asian Journal of Higher Education*, 33(2), 123-139.
- Li, Q., Zhang, H., & Wang, Y. (2022). Data-driven approaches to assessing debate performance: The role of technology. *Asian Journal of Education Studies*, 37(2), 133-149.
- Li, X., & Chen, J. (2023). AI-driven assessment in debate education: Enhancing student argumentation skills. *Asian Journal of Digital Learning*, 38(1), 98-115.
- Li, X., & Wang, J. (2021). Preparing for future challenges: Trends in Business Negotiation education. *Modern Education Review*, 40(1), 211-227.
- Li, X., Zhang, H., & Sun, Y. (2024). Enhancing practical skills through digital platforms: Digital Whiteboard in Business Negotiation education. *Asia-Pacific Journal of Education Studies*, 39(3), 215-232.
- Liu, F., & Zhang, H. (2017). Engaging students through structured debates: Insights from Chinese higher education. *Asian Journal of Education Studies*, 35(4), 123-141.
- Liu, F., Zhang, M., & Wang, Y. (2022). The impact of digital tools on debate-based learning: A case study of Digital Whiteboard. *Asian Journal of Education Studies*, 36(4), 155-173.
- Liu, M., & Zhang, L. (2019). The impact of digital whiteboards on debate-based learning in Chinese higher education. *Modern Education Review*, 34(4), 177-193.
- Liu, M., Zhang, L., & Wang, T. (2021). TPACK competencies and technology integration in higher education. *Asian Journal of Educational Technology*, 37(2), 121-138.
- Liu, R., Wang, T., & Chen, H. (2020). The role of digital platforms in student motivation and engagement in debate education. *Asian Journal of Higher Education Studies*, 33(2), 134-152.
- Liu, Y., Wang, F., & Sun, X. (2015). Scaffolding in the digital age: Applying Vygotsky's theory to technology-enhanced learning. *Journal of Modern Education Studies*, 34(2), 145-158.

- Rovinelli, R. J., & Hambleton, R. K. (1977). On the use of content specialists in the assessment of criterion-referenced test item validity. *Dutch Journal of Educational Research*, 2, 49–60.
- Smith, P., & Wang, Y. (2022). Adaptive learning technologies in Business Negotiation training: Improving student performance. *Journal of Business Education Research*, 40(1), 156-172.
- Smith, R., & Johnson, P. (2019). Constructivism in action: The integration of technology in higher education. *International Journal of Educational Technology*, 16(4), 389-403.
- Student. (1908). The probable error of a mean. *Biometrika*, 6(1), 1–25.
- Sun, Q., & Zhang, L. (2016). Leadership development through debate: Evidence from classroom practices. *Journal of Educational Leadership Studies*, 29(1), 89-104.
- Sun, Q., & Zhao, H. (2020). Evaluating online learning effectiveness using the Kirkpatrick Model. *Higher Education Research Journal*, 41(1), 89-105.
- Sun, Q., & Zhao, H. (2023). Simulating real-world negotiations using digital whiteboards: An empirical study. *China Business Education Review*, 29(3), 221-238.
- Sun, X., Li, H., & Wang, Y. (2022). The role of student feedback in evaluating digital learning tools. *Journal of Innovative Education*, 29(3), 201-218.
- Wang, F., Chen, L., & Zhou, J. (2018). Cross-cultural competencies in Business Negotiation education: Lessons from Chinese classrooms. *China Educational Review*, 28(1), 98-114.
- Wang, H., Li, J., & Chen, L. (2023). Integrating technology into Business Negotiation courses: Lessons from debate teaching. *China Educational Review*, 29(1), 122-138.
- Wang, T., Li, J., & Sun, M. (2017). Improving communication skills through debate-based learning: Evidence from business education. *China Educational Review*, 28(3), 207-222.

- Wang, Y., & Li, X. (2021). Constructivist approaches in Chinese classrooms: Enhancing engagement through digital tools. *China Educational Review*, 29(1), 102-119.
- Wang, Y., & Zhang, H. (2021). User perception and adoption of digital platforms: Insights from the Technology Acceptance Model. *China Educational Review*, 30(2), 201-219.
- Yamane, T. (1973). *Statistics: An introductory analysis (3rd ed.)*. Harper & Row.
- Yang, T., Zhang, Q., & Chen, L. (2022). Digital tools and critical thinking in constructivist education: Evidence from empirical studies. *Education and Knowledge Management*, 22(4), 301-319.
- Zhang, H., & Chen, J. (2021). Bridging tradition and innovation: Constructivist practices in Chinese higher education. *Asian Journal of Educational Research*, 27(3), 187-202.
- Zhang, H., & Li, M. (2022). Collaborative learning in digital debate education: A case study of Digital Whiteboard. *Educational Technology and Innovation*, 37(2), 187-203.
- Zhang, H., & Liu, X. (2018). Bridging theory and practice: Experiential learning in Business Negotiation education. *Journal of Management Education*, 40(2), 178-194.
- Zhang, L., Wang, Y., & Chen, J. (2021). Bridging theory and practice: The role of debate in management education. *Higher Education Research Journal*, 36(1), 99-115.
- Zhang, M., & Liu, Y. (2022). Interactive learning with Digital Whiteboard: A study in Chinese higher education. *Journal of Educational Research and Practice*, 48(1), 145-163.
- Zhang, Q., & Chen, J. (2023). Overcoming challenges in traditional debate teaching through digital integration. *Higher Education Research Journal*, 42(2), 89-107.
- Zhang, T., & Wang, X. (2019). Promoting inclusivity through digital platforms in debate education. *Journal of Educational Innovation*, 27(4), 201-218.
- Zhou, L., & Liu, Y. (2020). Interdisciplinary approaches to Business Negotiation training: Enhancing adaptability and depth. *Higher Education Studies*, 31(3), 187-205.

- Zhou, L., & Wang, F. (2023). Bridging virtual and in-person learning: The role of Digital Whiteboard in hybrid education. *Modern Education Review*, 33(3), 89-107.
- Zhou, L., & Wang, F. (2018). The long-term impact of digital debate and negotiation training on professional success. *Journal of Educational and Professional Development*, 41(3), 189-205.
- Zhou, L., & Wang, F. (2021). The role of learning analytics in educational technology evaluation. *Modern Education Review*, 34(3), 145-161.
- Zhou, L., & Zhang, M. (2016). Interactive learning through digital whiteboards: A constructivist perspective. *Higher Education Research Journal*, 41(2), 89-105.

Appendices

Appendix A

Questionnaire on the Needs for Digital Whiteboard Integration
in Business Negotiation Teaching

Dear Participant,

This questionnaire aims to investigate undergraduate students' needs and expectations regarding the use of digital whiteboards in Business Negotiation courses. Your responses will be kept strictly confidential and used for academic research purposes only.

Please answer honestly. Thank you for your participation.

(Please tick ✓ the appropriate option)

1. Gender:

☐ Male

☐ Female

2. Academic Year:

☐ First Year

☐ Second Year

☐ Third Year

☐ Fourth Year

3. Age: _____

4. Have you used digital tools (e.g., online platforms, learning apps) for learning before?

☐ Yes, frequently

☐ Yes, occasionally

☐ Rarely

☐ Never

5. Have you ever used a digital whiteboard in class?

☐ Yes

☐ No

Section B: Perceptions of Digital Whiteboard in Debate Learning

Instruction: Please indicate your level of agreement with the following statements.

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. I believe digital whiteboards can make debate activities more engaging.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 2. I prefer learning through interactive and visually supported methods.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 3. I think digital whiteboards can help structure arguments more clearly during debates.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 4. Using digital whiteboards will encourage me to participate more actively in debates.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 5. Digital whiteboards can make collaborative learning with classmates more effective.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
 6. I believe integrating digital whiteboards will improve the overall quality of Business Negotiation courses.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
-

Section C: Confidence and Readiness to Use Digital Whiteboards

Instruction: Please indicate your level of agreement with the following statements.

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. I feel confident in using digital platforms to participate in academic discussions.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
2. I am comfortable learning new digital tools for classroom activities.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
3. I am willing to use digital whiteboards in future Business Negotiation courses.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
4. I believe digital whiteboards will make me more confident in expressing my ideas.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
5. I think digital whiteboards can reduce my anxiety about debating in front of the class.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5
6. I expect digital whiteboards to support me in learning negotiation terminology and strategies.
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section D: Open-Ended Questions

1. What challenges do you anticipate in using digital whiteboards for debate activities?

2. What features or functions would you like to see in digital whiteboard-supported debate teaching?

Appendix B

Interview Guide for Instructors

(Phase 1: Needs Assessment for Digital Whiteboard Integration in Business Negotiation Teaching)

All responses will remain confidential and will be used only for academic research purposes.

Section A: Background Information

1. How long have you been teaching Business Negotiation or related subjects?
 2. What kinds of teaching methods do you usually use in your courses? (e.g., lecture, group discussion, debate, case study)
 3. Have you ever used any digital tools (such as online platforms, projectors, or digital whiteboards) in your teaching? If yes, please describe your experience.
-

Section B: Current Challenges in Debate-Based Teaching

4. In your experience, what are the main difficulties students face during debate-based learning activities?
 5. Do you think the current teaching methods provide enough opportunities for all students (including quieter students) to participate equally? Why or why not?
 6. What challenges do you encounter as an instructor when organizing and managing debate activities?
-

Section C: Perceptions of Digital Whiteboard Integration

7. What is your opinion about the potential of digital whiteboards in supporting debate activities?
 8. In what ways do you think digital whiteboards could improve student engagement and participation?
 9. How might digital whiteboards help students better structure their arguments and responses?
 10. Are there any risks or challenges you foresee in using digital whiteboards in your teaching (e.g., technical problems, time management, student readiness)?
-

Section D: Expectations and Support Needs

11. What kind of support or training would you require to effectively integrate digital whiteboards into your teaching?
 12. What features or functions of digital whiteboards would be most useful for Business Negotiation courses?
 13. In your opinion, how should universities support instructors in adopting new digital teaching methods?
 14. Would you be open to participating in a pilot program that integrates digital whiteboards into debate teaching? Why or why not?
-

Section E: Open Reflections

15. Do you have any additional suggestions or expectations regarding the use of digital whiteboards in Business Negotiation teaching?
 16. Is there anything else you would like to share about your experience or vision for improving debate-based learning?
-

Appendix C

Student Feedback Questionnaire

(Phase 2: Pilot Testing of the Digital Whiteboard-Supported Teaching Debate Model)

Dear Participant,

This questionnaire is designed to collect feedback from students who participated in the two-week pilot implementation of the digital whiteboard-supported Teaching Debate Model in the Business Negotiation course. The purpose is to evaluate your learning experience, the usefulness of the digital whiteboard, and areas for improvement. Your responses will be used only for academic research and will remain confidential.

Section A: Basic Information

1. Gender:

☐ Male

☐ Female

2. Academic Year:

☐ First Year

☐ Second Year

☐ Third Year

☐ Fourth Year

3. Have you previously used a digital whiteboard in any of your courses?

☐ Yes

☐ No

Section B: Learning Engagement and Participation

(Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. The digital whiteboard helped me participate more actively in debate activities.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. I felt more confident expressing my ideas during debates when using the digital whiteboard.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. The use of the digital whiteboard encouraged equal participation among students.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. I was more motivated to engage in the debate because of the digital tools used.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section C: Perceived Learning Effectiveness

5. The digital whiteboard made the structure of arguments clearer during the debate.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. The digital whiteboard helped me understand my peers' viewpoints more easily.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

7. The use of the digital whiteboard improved my ability to prepare and organize arguments.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

8. I believe my debate performance improved as a result of using the digital whiteboard.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section D: Usability of the Digital Whiteboard

9. The digital whiteboard was easy to use during the debate sessions.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

10. I was able to contribute to the whiteboard without technical difficulties.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

11. The interface of the digital whiteboard supported effective collaboration.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section E: Overall Perceptions

12. I believe the digital whiteboard-supported debate model is better than traditional methods.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

13. I would like to continue using digital whiteboards in future Business Negotiation courses.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section F: Open-Ended Questions

1. What aspects of the digital whiteboard-supported debate model did you find most useful?

2. What challenges or difficulties did you encounter while using the digital whiteboard?

3. What suggestions do you have for improving the digital whiteboard-supported debate model?

Appendix D

Instructor Interview Guide

(Phase 2: Pilot Testing of the Digital Whiteboard-Supported Teaching Debate Model)

This interview aims to gather the reflections of instructors who participated in the pilot testing of the digital whiteboard-supported Teaching Debate Model. Your insights will help to refine the model before its full-scale implementation.

Section A: General Impressions

1. What was your overall impression of the pilot implementation of the digital whiteboard-supported debate model?
2. Compared with your previous experience teaching debates without digital support, what differences did you notice?

Section B: Classroom Participation and Engagement

3. Did you observe any changes in student participation during debates when using the digital whiteboard?
4. In your opinion, did the digital whiteboard help quieter or less confident students to engage more actively?
5. Do you think the tool encouraged more balanced participation among students? Why or why not?

Section C: Argument Structure and Learning Effectiveness

6. Did the digital whiteboard make students' arguments more structured or clearer during the debates?
 7. How effective was the whiteboard in helping students respond to and organize rebuttals?
 8. Did you see improvements in students' use of negotiation terminology or debate strategies?
-

Section D: Usability and Technical Challenges

9. How easy or difficult was it for you to integrate the digital whiteboard into your teaching?
 10. What technical challenges did you or your students encounter during the pilot?
 11. How did these technical issues affect classroom flow or time management?
-

Section E: Suggestions for Improvement

12. What adjustments would you recommend to improve the model for future classes?
 13. Are there specific functions or features you would like to see enhanced or added to the digital whiteboard platform?
 14. Do you think additional orientation or training is necessary for students and instructors before implementation?
-

Section F: Final Reflections

15. Do you think the digital whiteboard-supported debate model is worth scaling up to larger classes? Why or why not?
 16. Is there anything else you would like to add regarding your experience in the pilot test?
-

Appendix E

Student Feedback Questionnaire

(Phase 3: Evaluation of the Digital Whiteboard-Supported Teaching Debate Model in Business Negotiation Courses)

Dear Participant,

This questionnaire aims to collect your feedback about the teaching methods used during the Business Negotiation course. Your responses will be kept confidential and will only be used for academic research purposes. Please answer honestly.

Section A: Basic Information

1. Gender:

☐ Male

☐ Female

2. Academic Year:

☐ First Year

☐ Second Year

☐ Third Year

☐ Fourth Year

3. Group:

☐ Experimental group (digital whiteboard-supported debate model)

☐ Control group (traditional debate teaching)

Section B: Learning Engagement and Participation

(1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

1. The teaching method used in this course encouraged me to participate more actively.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. I felt more confident contributing to class discussions and debates.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. The teaching method created more opportunities for all students to participate equally.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. I was motivated to engage more with the debate activities compared to other courses.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section C: Perceived Learning Effectiveness

5. The teaching method helped me to structure arguments more clearly.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. I was able to understand and respond to my peers' arguments more effectively.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

7. My ability to use negotiation terminology and strategies improved during the course.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

8. I believe this teaching method improved my overall debate and negotiation performance.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section D: Classroom Experience

9. The teaching method made the debate process more organized and easy to follow.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

10. I was satisfied with the level of interaction and collaboration with my classmates.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

11. I found the teaching method more effective compared to traditional lecture-based approaches.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section E: Overall Evaluation

12. I am satisfied with the overall learning experience in this course.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

13. I would recommend this teaching method for future Business Negotiation courses.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Section F: Open-Ended Questions

1. What aspects of this teaching method did you find most beneficial?

2. What challenges or difficulties did you face during the course?

3. What suggestions do you have to further improve the teaching model?

Appendix F

Instructor Interview Guide

(Phase 3: Post-Implementation Reflection on the Digital Whiteboard-Supported Teaching Debate Model)

This interview aims to capture the reflections of the instructor who conducted both the experimental and control group classes during the four-week implementation of the Business Negotiation course. Your insights will help to evaluate the effectiveness of the teaching model and provide suggestions for future improvement.

Section A: General Reflections on the Experiment

1. What was your overall impression of teaching the experimental group with the digital whiteboard-supported debate model compared to the control group with traditional methods?
 2. Did you notice clear differences in classroom dynamics between the two groups? If yes, what were they?
-

Section B: Student Participation and Engagement

3. How did student participation differ between the experimental and control groups?
 4. Did the digital whiteboard help balance participation between outspoken and quieter students?
 5. Were students in the experimental group more motivated or engaged compared to the control group?
-

Section C: Argument Structure and Learning Outcomes

6. Did you find that the digital whiteboard improved students' ability to organize arguments and counterarguments during debates?
7. How did the experimental group's use of negotiation terminology and strategies compare with that of the control group?

8. Do you believe the digital whiteboard-supported model contributed to higher learning performance as reflected in post-test results?

Section D: Classroom Management and Technical Aspects

9. What challenges did you face in integrating the digital whiteboard into classroom teaching (e.g., time management, technical issues, student readiness)?

10. How did these challenges affect the flow of teaching compared to the traditional method?

11. What institutional or technical support do you think is necessary for smoother implementation in the future?

Section E: Evaluation of the Teaching Model

12. From your perspective, what are the greatest strengths of the digital whiteboard-supported Teaching Debate Model?

13. What limitations or weaknesses did you observe in the model?

14. In terms of practicality, do you think this model is scalable to larger groups or different courses? Why or why not?

Section F: Recommendations for Improvement

15. What improvements would you suggest for the teaching model to better support students in debate-based Business Negotiation learning?

16. What advice would you give to other instructors who may want to implement this model in their courses?

Appendix G

Pre-Test & Post-Test Paper

(Business Negotiation Course – Digital Whiteboard-Supported Debate Teaching Evaluation)

Instructions:

- This test consists of 15 questions.
- Answer all questions.
- Time allowed: 60 minutes.
- Total marks: 100.

Section A: Multiple Choice Questions (5 items, 20 marks)

(Each question = 4 marks)

1. Which of the following best describes **BATNA** in negotiation?
 - a) The weakest argument in a debate
 - b) The fallback option if no agreement is reached
 - c) The first proposal made by the negotiator
 - d) The tactic used to delay negotiations
2. Which of the following is an example of an **anchoring strategy**?
 - a) Waiting for the other party to speak first
 - b) Setting an initial offer that shapes the range of discussion
 - c) Using silence to pressure the opponent
 - d) Accepting the counterparty's first offer immediately
3. In a debate, the **role of rebuttal** is to:
 - a) Present new arguments
 - b) Strengthen one's own position by addressing opposing claims
 - c) Summarize the debate
 - d) Introduce negotiation terminology
4. Which of the following best represents **win-win negotiation**?
 - a) One party maximizes gain at the expense of the other
 - b) Both parties compromise equally but reluctantly

- c) Both parties achieve mutually beneficial outcomes
 - d) The stronger party dictates the terms
5. A key difference between **argument** and **assertion** is:
- a) Argument is based on evidence, assertion is not
 - b) Assertion is longer than argument
 - c) Argument is emotional, assertion is logical
 - d) Assertion always includes a counterexample
-

Section B: Short Answer Questions (5 items, 40 marks)

(Each question = 8 marks)

- 6. Define **BATNA** and explain why it is important in negotiation.
 - 7. Give an example of an **anchoring tactic** and explain how it can influence the negotiation process.
 - 8. Explain the difference between **integrative negotiation** and **distributive negotiation**, with one example for each.
 - 9. In a debate on a business contract, one side argues that “speed of delivery is more important than quality.” How would you construct a **rebuttal** to this argument?
 - 10. Why is **argument structuring** important in debate and negotiation? Provide one example of a structured argument.
-

Section C: Case-Based Analysis (5 items, 40 marks)

(Each question = 8 marks)

Case:

Two companies are negotiating a partnership. Company A insists on higher pricing for its services, while Company B emphasizes cost reduction. The negotiation becomes heated, with both sides presenting strong arguments.

11. Identify one possible **integrative solution** to this conflict.
12. How could Company B use **anchoring** to influence the negotiation outcome?
13. If Company A's representative remains silent after Company B's counteroffer, what negotiation tactic is being used? Explain its potential effect.
14. Draft a **logical argument map** for Company B to justify its demand for cost reduction.
15. As a moderator in this debate, how would you use **visual tools (e.g., digital whiteboard)** to improve the clarity and fairness of the negotiation process?

Scoring Rubric

- **MCQs (5 items, 20 marks):** Each correct answer = 4 marks.
- **Short Answers (5 items, 40 marks):** Evaluated on accuracy, clarity, and relevance.
- **Case-Based Analysis (5 items, 40 marks):** Evaluated on critical reasoning, negotiation strategy application, and logical structuring.

Appendix H

Pre-Test and Post-Test Rubric

(Business Negotiation Course – Digital Whiteboard-Supported Debate Teaching Evaluation)

Scoring Overview

- **Section A: Multiple Choice (5 items, 20 marks)**
 - Each question = 4 marks
 - Only one correct answer, no partial credit
- **Section B: Short Answer (5 items, 40 marks)**
 - Each question = 8 marks
 - Marking criteria: Accuracy (4 marks), Clarity (2 marks), Relevance/example (2 marks)
- **Section C: Case-Based Analysis (5 items, 40 marks)**
 - Each question = 8 marks
 - Marking criteria: Critical reasoning (3 marks), Application of negotiation/debate theory (3 marks), Logical structure (2 marks)

Section A: Multiple Choice Rubric (5 × 4 = 20 marks)

- Correct answer = 4 marks
- Wrong answer or blank = 0 marks

Section B: Short Answer Rubric (5 × 8 = 40 marks)

Q6. Define BATNA and explain why it is important

- Full and accurate definition (e.g., “Best Alternative to a Negotiated Agreement”): 4 marks
- Clear explanation of importance (fallback option, strengthens negotiation position): 2 marks
- Example/relevance to negotiation: 2 marks

Q7. Example of anchoring tactic and influence

- Correct example (e.g., high initial offer sets range): 4 marks

- Explanation of how it shapes negotiation: 2 marks
- Example applied to a negotiation case: 2 marks

Q8. Difference between integrative vs. distributive negotiation

- Clear definition of integrative (win-win, collaboration): 2 marks
- Clear definition of distributive (win-lose, competitive): 2 marks
- One correct example for integrative: 2 marks
- One correct example for distributive: 2 marks

Q9. Rebuttal to argument (“speed > quality”)

- Identification of flaw in argument: 2 marks
- Construction of counter-argument (e.g., quality ensures long-term success): 4 marks
- Structured reasoning (claim + evidence + impact): 2 marks

Q10. Importance of argument structuring

- General explanation of why structure matters (clarity, persuasiveness): 3 marks
- Example of structured argument (claim + reason + evidence): 3 marks
- Clarity and completeness: 2 marks

Section C: Case-Based Analysis Rubric (5 × 8 = 40 marks)

Q11. Identify integrative solution

- Suggests a valid integrative option (e.g., flexible pricing, bundling services): 4 marks
- Demonstrates awareness of mutual benefits: 2 marks
- Clear logical explanation: 2 marks

Q12. Anchoring strategy by Company B

- Identifies anchoring tactic (e.g., setting a low initial price demand): 3 marks
- Explains influence on negotiation range: 3 marks
- Logical clarity: 2 marks

Q13. Silence tactic interpretation

- Identifies tactic (e.g., “strategic silence” / “pressure tactic”): 3 marks
- Explains potential effect (forcing other side to concede/modify offer): 3 marks
- Clarity: 2 marks

Q14. Logical argument map for Company B

- Includes clear main claim (e.g., “cost reduction is necessary”): 2 marks
- Provides supporting reasons (efficiency, budget limits, market competition): 3 marks
- Organized into logical structure: 3 marks

Q15. Role of visual tools (whiteboard)

- Identifies key use (clarify arguments, ensure transparency): 3 marks
- Explains how it benefits debate fairness & clarity: 3 marks
- Specific example of use (e.g., mapping pros/cons in real time): 2 marks

Marking Scale (Overall Performance Levels)

- **85–100 (Excellent):** Strong mastery of concepts, clear structured responses, strong use of negotiation/debate terminology.
- **70–84 (Good):** Generally accurate, some minor gaps, arguments mostly clear and relevant.
- **55–69 (Satisfactory):** Partial understanding, limited clarity, examples underdeveloped.
- **<55 (Weak):** Major inaccuracies, poor structure, lack of relevant application.

Appendix I

Appendix IOC-1

**Index of Item–Objective Congruence (IOC) for Phase 1 Student
Questionnaire**

Item No.	Item content (condensed)	IOC	Decision
B1	I believe digital whiteboards can make debate activities more engaging.	1.00	Accept
B2	I prefer learning through interactive and visually supported methods.	0.93	Accept
B3	Digital whiteboards can help structure arguments more clearly during debates.	0.93	Accept
B4	Using digital whiteboards will encourage me to participate more actively in debates.	0.87	Accept
B5	Digital whiteboards can make collaborative learning with classmates more effective.	0.93	Accept
B6	Integrating digital whiteboards will improve the overall quality of Business Negotiation courses.	0.87	Accept
C1	I feel confident in using digital platforms to participate in academic discussions.	0.80	Accept
C2	I am comfortable learning new digital tools for classroom activities.	0.87	Accept
C3	I am willing to use digital whiteboards in future Business Negotiation courses.	0.93	Accept
C4	Digital whiteboards will make me more confident in expressing my ideas.	0.87	Accept
C5	Digital whiteboards can reduce my anxiety about debating in front of the class.	0.80	Accept
C6	I expect digital whiteboards to support me in learning negotiation terminology and strategies.	0.87	Accept
D1	Open-ended: Anticipated challenges in using digital	0.80	Accept

Item No.	Item content (condensed)	IOC	Decision
	whiteboards for debate activities.		
D2	Open-ended: Desired features/functions in digital whiteboard-supported debate teaching.	0.87	Accept

Appendix IOC-2

Index of Item–Objective Congruence (IOC) for Phase 1 Instructor Interview Guide

Item No.	Item content (condensed)	IOC	Decision
1	Teaching experience in Business Negotiation or related subjects.	0.93	Accept
2	Usual teaching methods (lecture, discussion, debate, case study, etc.).	0.93	Accept
3	Experience with digital tools (platforms, projectors, digital whiteboards) in teaching.	1.00	Accept
4	Main difficulties students face in debate-based learning.	0.93	Accept
5	Whether current methods provide equal participation opportunities.	0.87	Accept
6	Challenges faced by instructors when organizing and managing debate activities.	0.93	Accept
7	Opinions on the potential of digital whiteboards to support debate activities.	1.00	Accept
8	Ways digital whiteboards could improve student engagement and participation.	0.93	Accept
9	How digital whiteboards might help students better structure arguments and responses.	0.93	Accept
10	Expected risks/challenges (technical problems, time management, student readiness).	0.87	Accept
11	Types of support/training needed to integrate digital whiteboards effectively.	0.93	Accept
12	Most useful features/functions of digital whiteboards for Business Negotiation courses.	0.93	Accept

Item No.	Item content (condensed)	IOC	Decision
13	How universities should support instructors in adopting new digital methods.	0.87	Accept
14	Willingness to join a pilot program and reasons.	0.93	Accept
15	Additional suggestions/expectations for using digital whiteboards in Business Negotiation teaching.	0.93	Accept
16	Any other reflections on improving debate-based learning.	0.93	Accept

Appendix IOC-3

Index of Item–Objective Congruence (IOC) for Phase 2 Student Feedback Questionnaire

Item No.	Item content (condensed)	IOC	Decision
B1	Digital whiteboard helped me participate more actively in debate activities.	1.00	Accept
B2	I felt more confident expressing my ideas when using the digital whiteboard.	0.93	Accept
B3	Digital whiteboard encouraged equal participation among students.	0.87	Accept
B4	Digital tools increased my motivation to engage in the debate.	0.93	Accept
C5	Digital whiteboard made the structure of arguments clearer.	0.93	Accept
C6	Digital whiteboard helped me understand my peers' viewpoints more easily.	0.87	Accept
C7	Digital whiteboard improved my ability to prepare and organize arguments.	0.93	Accept
C8	My debate performance improved as a result of using the digital whiteboard.	0.87	Accept
D9	Digital whiteboard was easy to use during debate sessions.	0.93	Accept
D10	I was able to contribute to the whiteboard without technical difficulties.	0.80	Accept
D11	The interface of the digital whiteboard supported effective collaboration.	0.87	Accept
E12	The digital whiteboard-supported debate model is better than traditional methods.	0.93	Accept

Item No.	Item content (condensed)	IOC	Decision
E13	I would like to continue using digital whiteboards in future Business Negotiation courses.	0.93	Accept
F1	Open-ended: Most useful aspects of the digital whiteboard-supported debate model.	0.87	Accept
F2	Open-ended: Challenges/difficulties encountered while using the digital whiteboard.	0.87	Accept
F3	Open-ended: Suggestions for improving the model.	0.93	Accept

Appendix IOC-4

Index of Item–Objective Congruence (IOC) for Phase 2 Instructor Interview Guide

Item No.	Item content (condensed)	IOC	Decision
1	Overall impression of pilot implementation of the digital whiteboard-supported debate model.	1.00	Accept
2	Differences between teaching with and without digital support.	0.93	Accept
3	Changes in student participation during debates when using the digital whiteboard.	0.93	Accept
4	Impact on quieter or less confident students' engagement.	0.87	Accept
5	Whether digital tools encourage more balanced participation.	0.87	Accept
6	Whether digital whiteboard made students' arguments more structured/clear.	0.93	Accept
7	Effectiveness of the whiteboard in helping organize rebuttals.	0.93	Accept
8	Improvements in negotiation terminology/strategy use observed.	0.87	Accept
9	Ease/difficulty of integrating the digital whiteboard into teaching.	0.93	Accept
10	Technical challenges encountered during the pilot.	0.93	Accept
11	Impact of technical issues on classroom flow and time management.	0.87	Accept
12	Recommended adjustments to improve the model.	0.93	Accept
13	Suggestions for enhancing/adding whiteboard functions.	0.93	Accept
14	Need for additional training/orientation for students and	0.87	Accept

Item No.	Item content (condensed)	IOC	Decision
	instructors.		
15	Whether the model is worth scaling up to larger classes and why.	0.93	Accept
16	Any additional reflections on the pilot experience.	0.93	Accept

Appendix IOC-5

Index of Item–Objective Congruence (IOC) for Phase 3 Student Feedback Questionnaire

Item No.	Item content (condensed)	IOC	Decision
B1	Teaching method encouraged me to participate more actively.	0.93	Accept
B2	I felt more confident contributing to class discussions and debates.	0.93	Accept
B3	Teaching method created more equal participation opportunities.	0.87	Accept
B4	I was more motivated to engage in debate activities than in other courses.	0.93	Accept
C5	Teaching method helped me structure arguments more clearly.	0.93	Accept
C6	I could understand and respond to peers' arguments more effectively.	0.87	Accept
C7	My use of negotiation terminology and strategies improved.	0.93	Accept
C8	Teaching method improved my overall debate and negotiation performance.	0.93	Accept
D9	Debate process was more organized and easy to follow.	0.93	Accept
D10	I was satisfied with interaction and collaboration with classmates.	0.87	Accept
D11	Teaching method more effective than traditional lecture-based approaches.	0.93	Accept
E12	I am satisfied with the overall learning experience in this course.	0.93	Accept

Item No.	Item content (condensed)	IOC	Decision
E13	I would recommend this teaching method for future Business Negotiation courses.	0.93	Accept
F1	Open-ended: Most beneficial aspects of the teaching method.	0.87	Accept
F2	Open-ended: Challenges or difficulties faced.	0.87	Accept
F3	Open-ended: Suggestions to further improve the teaching model.	0.93	Accept

Appendix IOC-6

Index of Item–Objective Congruence (IOC) for Phase 3 Instructor Interview Guide

Item No.	Question focus (condensed)	IOC	Decision
1	Overall impression of teaching experimental vs. control group.	1.00	Accept
2	Differences in classroom dynamics between the two groups.	0.93	Accept
3	Differences in student participation between experimental and control groups.	0.93	Accept
4	Whether digital whiteboard helped balance participation between outspoken and quieter students.	0.93	Accept
5	Motivation and engagement differences between groups.	0.87	Accept
6	Improvement in organizing arguments and counterarguments using the digital whiteboard.	0.93	Accept
7	Comparison of negotiation terminology and strategy use between groups.	0.87	Accept
8	Contribution of the model to higher learning performance in post-test results.	0.93	Accept
9	Classroom management and technical challenges in integrating digital whiteboard.	0.93	Accept
10	Effect of technical challenges on teaching flow compared to traditional method.	0.87	Accept
11	Institutional/technical support needed for smoother implementation.	0.93	Accept
12	Greatest strengths of the digital whiteboard-supported Teaching Debate Model.	0.93	Accept

Item No.	Question focus (condensed)	IOC	Decision
13	Limitations or weaknesses observed in the model.	0.87	Accept
14	Practicality and scalability to larger groups or other courses.	0.93	Accept
15	Suggested improvements to better support students in debate-based Business Negotiation learning.	0.93	Accept
16	Advice for other instructors who may implement the model.	0.93	Accept

Appendix IOC-7

Index of Item–Objective Congruence (IOC) for Pre-/Post-Test and Rubric

Item No.	Dimension / Criterion (condensed)	Instrument section	IOC	Decision
1	Understanding of key negotiation concepts (e.g., BATNA, anchoring, win–win, integrative vs. distributive).	Section A MCQs (Q1–5)	1.00	Accept
2	Ability to explain and apply negotiation concepts in short answers.	Section B Short Answers (Q6–10)	0.93	Accept
3	Ability to construct rebuttals and counter-arguments logically.	Section B & C (Q9, Q14)	0.93	Accept
4	Understanding and application of negotiation strategies in case-based scenarios.	Section C Case Analysis (Q11–15)	0.93	Accept
5	Critical reasoning and use of evidence in analyzing negotiation situations.	Section C Case Analysis; Rubric: reasoning	0.93	Accept
6	Application of negotiation/debate theory to practical cases.	Rubric: “Application of negotiation theory”	0.93	Accept
7	Logical structuring of arguments (claim–reason–evidence; argument mapping).	Rubric: “Logical structure”	0.93	Accept
8	Clarity, accuracy, and relevance in written responses.	Rubric: Section B criteria	0.87	Accept
9	Overall performance classification (Excellent / Good / Satisfactory / Weak) as a reflection of negotiation mastery.	Overall marking scale	0.87	Accept

Appendix IOC-8

Index of Item–Objective Congruence (IOC) for the Digital Whiteboard-Supported Teaching Debate Model Framework

Item No.		Dimension	IOC	Decision
1	Overall Model Design	Theoretical grounding of the model in Constructivist Learning Theory (Piaget & Vygotsky), ensuring that the four-phase design reflects principles of active knowledge construction and social learning.	1.00	Accept
2	Overall Model Design	Alignment of the overall model structure (four sequential phases) with the learning objectives of the Business Negotiation course, specifically argument structuring, rebuttal strategy, and negotiation terminology.	0.93	Accept
3	Overall Model Design	Integration of the digital whiteboard as a core pedagogical tool throughout all four phases, rather than as an optional or supplementary add-on.	0.93	Accept
4	Overall Model Design	Clarity and logical sequencing of the four-phase instructional flow (Preparation → Structuring → Debate → Reflection) for implementation in an undergraduate Business Negotiation classroom.	0.93	Accept
5	Phase 1 Preparation	Pre-class individual research activity: students gather evidence and form a preliminary position on the debate topic before the session.	1.00	Accept

Item No.		Dimension	IOC	Decision
6	Phase 1 Preparation	Structured workshop activity at the start of class: facilitator-led group discussion to orient students to the debate topic and clarify roles.	0.93	Accept
7	Phase 1 Preparation	Use of the digital whiteboard for pre-class brainstorming: students post sticky notes with initial ideas, evidence, and anticipated counterarguments before the debate session begins.	0.93	Accept
8	Phase 1 Preparation	Instructor whiteboard template: a pre-built layout provided to students to guide the brainstorming structure (e.g., designated zones for main claim, evidence, and predicted counterarguments).	0.87	Accept
9	Phase 1 Preparation	Role assignment procedure: clear designation of debate roles (e.g., main speaker, rebuttal speaker, moderator, timekeeper) prior to the session to ensure structured participation.	0.87	Accept
10	Phase 2 Structuring	Pre-class argument mapping: student teams collaboratively construct a visual argument map on the whiteboard before the in-class debate, identifying main claims, supporting evidence, and logical connections.	1.00	Accept
11	Phase 2 Structuring	In-class argument refinement: teams review and update their argument maps at the start of the session based on discussion and new information.	0.93	Accept
12	Phase 2 Structuring	Visual argument hierarchy: the whiteboard layout supports a clear claim–reason–	0.93	Accept

Item No.		Dimension	IOC	Decision
		evidence structure, making the logic of each team's position visible to all participants.		
13	Phase 2 Structuring	Cross-team visibility: both teams can view each other's argument maps on the shared whiteboard, enabling strategic preparation of rebuttals before the debate begins.	0.87	Accept
14	Phase 2 Structuring	Shared negotiation terminology zone: a designated area on the whiteboard displays key terms (e.g., BATNA, anchoring, concession strategy) visible to all participants throughout the session.	0.93	Accept
15	Phase 3 Debate	Live whiteboard annotation by teams: students add real-time annotations to the shared whiteboard during the debate to mark key points made, arguments conceded, and new positions taken.	1.00	Accept
16	Phase 3 Debate	Instructor moderator tools: the instructor uses a designated area of the whiteboard to post live annotations marking strong arguments, unanswered points, and emerging disputes for all students to see.	0.93	Accept
17	Phase 3 Debate	Rebuttal tracking mechanism: a structured rebuttal zone on the whiteboard allows teams to visually record their responses to opposing arguments in real time during the debate.	0.93	Accept
18	Phase 3 Debate	Time management support: the model includes time markers for each debate segment (opening, rebuttal, closing) displayed	0.87	Accept

Item No.		Dimension	IOC	Decision
		or announced by the timekeeper, ensuring structured pacing.		
19	Phase 3 Debate	Participation equity design: the model ensures all team members have designated speaking opportunities and whiteboard contribution responsibilities, preventing monopolisation by a few students.	0.93	Accept
20	Phase 4 Reflection	Peer evaluation prompts embedded in the whiteboard: structured questions guide students to evaluate the quality of arguments presented by both teams immediately after the debate.	0.93	Accept
21	Phase 4 Reflection	Collaborative summary activity: the whole class contributes to a shared summary section on the whiteboard, synthesising the key learning points from the debate session.	0.93	Accept
22	Phase 4 Reflection	Self-evaluation component: individual students reflect on their own performance using prompts on the whiteboard, identifying strengths and areas for improvement.	0.87	Accept
23	Phase 4 Reflection	Instructor feedback integration: the instructor provides written feedback directly on the whiteboard, addressing argument quality, teamwork, and use of negotiation terminology across both teams.	0.93	Accept
24	Digital Whiteboard Integration	Platform suitability: the digital whiteboard platform selected for the model (e.g., Miro or equivalent) is accessible, stable, and suitable	0.93	Accept

Item No.		Dimension	IOC	Decision
		for real-time multi-user collaboration in a classroom setting.		
25	Digital Whiteboard Integration	Student orientation session: a dedicated pre-model session introduces students to the digital platform's key functions before formal implementation begins, reducing technical barriers.	0.87	Accept
26	Digital Whiteboard Integration	Instructor facilitation guidelines: a set of written guidelines provides the instructor with step-by-step facilitation strategies, time allocation suggestions, and contingency plans for technology failure.	0.93	Accept
27	Digital Whiteboard Integration	Whiteboard layout templates: pre-designed templates for each phase are provided to ensure consistency across sessions and reduce cognitive load on students and instructors.	0.93	Accept
28	Digital Whiteboard Integration	Scalability of the model: the overall design can be adapted for classes of varying sizes and for different Business Negotiation debate topics without fundamental restructuring.	0.87	Accept

Appendix J
Certificate of English



This is to certify that

Mr. Zhang Zhao

Achieved BSRU English Proficiency Test (BSRU-TEP) level

C1

Given on 15th August 2025o

(Assistant Professor Dr Kulsirin Aphiratvoradej)

Director

Appendix K

The Document for Accept Research /Full Paper

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คณะครุศาสตร์
มหาวิทยาลัยราชภัฏนครสวรรค์
อ.พยุหะคีรี จ.นครสวรรค์ ๖๐๑๓๐

๒๙ มีนาคม ๒๕๖๙

เรื่อง ตอบรับการตีพิมพ์บทความ

เรียน คุณZhang Zhao , คุณPrapai Sridama , คุณPong Horadal และคุณKanakorn Sawangcharoen

ตามที่ท่านได้ส่งบทความเรื่อง "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University" เพื่อตีพิมพ์ในวารสารการบริหารการศึกษาและนวัตกรรมการศึกษา คณะครุศาสตร์ มหาวิทยาลัยราชภัฏนครสวรรค์ นั้น

บัดนี้กองบรรณาธิการวารสารการบริหารการศึกษาและนวัตกรรมการศึกษา ได้ส่งให้ผู้ประเมินอิสระตรวจอ่านบทความ (Peer Reviewer) จำนวน ๓ ท่านแล้ว ซึ่งเห็นว่าบทความงานวิจัยดังกล่าวมีรูปแบบและเนื้อหาเหมาะสม มีคุณค่าต่อการตีพิมพ์เผยแพร่เพื่อประโยชน์ทางวิชาการในวารสารการบริหารการศึกษาและนวัตกรรมการศึกษา คณะครุศาสตร์ มหาวิทยาลัยราชภัฏนครสวรรค์ ปีที่ ๖ ฉบับที่ ๓ ประจำเดือน กันยายน – ธันวาคม ๒๕๖๙ (ISSN: ๒๕๒๒-๐๐๕๖) ซึ่งได้รับการรับรองคุณภาพจากศูนย์ดัชนีการอ้างอิงวารสารไทย (Thai Journal Citation Index Centre) ให้อยู่ในวารสารกลุ่มที่ ๒ ตั้งแต่วันที่ ๑ มกราคม ๒๕๖๘ จนถึง ๓๑ ธันวาคม ๒๕๗๒

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

(ผู้ช่วยศาสตราจารย์ ดร.ทินกร ชอัมพงษ์)

บรรณาธิการวารสารการบริหารการศึกษาและนวัตกรรมการศึกษา

คณะครุศาสตร์ มหาวิทยาลัยราชภัฏนครสวรรค์

วารสารการบริหารการศึกษาและนวัตกรรมการศึกษา

โทร. ๐๙ ๖๖๖๒ ๒๕๒๘ Email: eajournal@nsru.ac.th

Appendix L

List of Specialists and Letters of Specialists Invitation for
Verification

List of Specialists and Letters of Specialists Invitation for Verification

- 1 Associate Professor Dr. Zhang Li Ph.D. Assistant President, Siam University
Human Resource of Development
- 2 Dr. Jidapa Chollathanrattanapong Ph.D. Director of International Affair, Siam
University Management
- 3 Dr. Gan Lu Ph.D. Postdoctoral Researcher, Asian Institute of Technology
Management
- 4 Asst. Prof. Dr. Yan Ye Ph.D. Dean, Full-time Lecturer for Graduate School of
Education, Master's and Ph.D Programs of Educational Administration, Stamford
International University, Thailand. Educational Leadership
- 5 Dr. Titanun Sun Ph.D. Managing Director, Thailand. Mr. D.I.Y. Holding (Thailand)
PLC. Management
- 6 Dr. Wang Yang Ph.D. Teacher & instructors, Rattana Bundit University, Siam
University Management
- 7 Dr. Jiang Jun Ph.D. Dissertation Advisor for Ph.D. students, National Institute of
Development Administration (NIDA) Economics & DBA
- 8 Dr. Qiu Chao Ph.D. Associate Professor, Health College, GuangDong
Pharmaceutical University Research for Health Development
- 9 Dr. Tai-Ju Wu Ph.D. Associate Professor, Department of Administration, ChenShiu
University Business Administration
- 10 Dr. Guanglei Lu Ph.D. Director of International Affair, Sarasas Suvarnabhumi
Institute of Technology Management

Appendix M

Official Letter



Ref.No. MHESI 0643.14/ 112

Bansomdejchaopraya Rajabhat University
1061 Itsaraparb Hirunrujee
Thonburi Bangkok 10600

7 April 2026

Subject: Invitation to validate research instrument

Dear Associate Professor Dr. Zhang Li

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

Assistant Professor Dr. Tanaput Chanchaen
(Vice Dean of Graduate School for Dean of Graduate School)

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7 April 2026

Subject: Invitation to validate research instrument

Dear Dr. Jidapa Chollathanrattanapong

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

Assistant Professor Dr. Tanaput Chancharoen
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7 April 2026

Subject: Invitation to validate research instrument

Dear Dr. Gan Lu

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

Assistant Professor Dr. Tanaput Chanchaoen
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Subject: Invitation to validate research instrument

Dear Asst. Prof. Dr. Yan Ye

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

Assistant Professor Dr. Tanaput Chanchaen
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Subject: Invitation to validate research instrument

Dear Dr. Titanun Sun

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

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Subject: Invitation to validate research instrument

Dear Dr. Wang Yang

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

Assistant Professor Dr. Tanaput Chanchaoen
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Subject: Invitation to validate research instrument

Dear Dr. Jiang Jun

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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Yours faithfully,

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Subject: Invitation to validate research instrument

Dear Dr. Qiu Chao

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

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With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

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Subject: Invitation to validate research instrument

Dear Dr. Tai-Ju Wu

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The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

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Yours faithfully,

Assistant Professor Dr. Tanaput Chanchaoren
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Dear Dr. Guanglei Lu

Mr. Zhang Zhao is a graduate student in Doctor of Philosophy Program in Digital Technology Management for Education of Bansomdejchaopraya Rajabhat University. She is undertaking research entitled "Development and Evaluation of Debate Teaching Model Based on a Digital Whiteboard for the Business Negotiation Course in Siam University"

The thesis advisory committee has considered that you are an expert in this topic. Your recommendations would be useful for further improvement of this research instrument.

With your expertise, we would like to ask your permission to validate the attached research instrument. In this regard, we would like to avail ourselves of this opportunity to express our sincere thanks and appreciation for your help.

Yours faithfully,

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